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LIST OF PUBLICATIONS AND PATENTS

JULY - DECEMBER 1947

NORTHERN REGIONAL RESEARCH LABORATORY, PEORIA, ILLINOIS

Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
United States Department of Agriculture

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PUBLICATIONS

Publications marked (*) are not available for distribution.

B-COMPLEX VITAMINS IN GRAIN SORGHUMS

By Fred W. Tanner Jr., Shirley E. Pfeiffer and J. J. Curtis. Cereal Chem. 24(4): 268-274. July 1947.
Analyses are presented for riboflavin, nicotinic acid, pantothenic acid, biotin and pyridoxin contents of 42 grain sorghums samples. Riboflavin varied from 0.65 to 2.03 μg/ml, nicotinic acid from 27.7 to 91.9 μg/ml, pantothenic acid 4.6 to 14.8 μg/g, biotin 0.11 to 0.46 μg/g and pyridoxin 2.8 to 8.0 μg/g. Nicotinic acid content is a heritable characteristic which was quantitatively altered through hybridization. The Cody variety (70-72 μg/g) represents a cross of Leoti (approx. 35 μg/g) X Club (approx. 45 μg/g). Strains containing more nicotinic acid than either parent variety were derived from a kafir and feterita cross represented by the Wonder Club variety and also from a Leoti X Atlas cross. The content of other B-vitamins does not appear to be a variety character.

COLLECTION AND QUALITY OF STRAW FOR STRAWBOARD

By S. I. Aronovsky, Agr. Engin. 28(7): 309-310. July 1947. Also published in Paper Trade Jour. 126(2): 51-52. January 1948 under the title "Collection and Quality of Straw for the Strawboard Industry."
A discussion of the use of wheat straw by the strawboard industry with particular emphasis on the need of better methods and machines for collecting straw. Tentative specifications for baled wheat straw for use by the strawboard industry are discussed.

ECONOMICS OF STRAW UTILIZATION

By E. C. Lathrop. Agr. Engin. 28(7): 308 310. July 1947; Paper Trade Jour. 125(8): 59-60. August 1947.
A brief discussion of the present and future uses of cereal straws in the production of paper and board products in this and other countries. The importance of improving the economics of the collection of such straws to widen their use in this country is emphasized.

THE SMALL RURAL INDUSTRY--A STUDY OF THE POSSIBILITY OF MAKING INSULATING BOARD FROM STRAW

By E. C. Lathrop, T. R. Naffziger, and R. V. Williamson. U. S. Dept. Agr. Cir. No. 762. August 1947.

A process for manufacturing insulating sheathing board from wheat straw in a small rural plant has been worked out. The physical properties of the board are competitive with present manufactured like products. Cost and profit margin estimates are presented. The importance of ability to merchandise the product in the local trading area, ability to operate the process without idle time and of good business management in relation to making the venture successful are stressed. In many localities the process would prove uneconomical or marginal. This study brings into clear perspective the economics, merchandising, business and manufacture of the small rural plant for making nonfood or nonfood products from agricultural materials in competition with large-scale, highly mechanized industries that make and distribute established products on a national scale.

THE PRODUCTION OF MOLD AMYLASES IN SUBMERGED CULTURE

By E. H. LeMense, Julian Corman, J. M. Van Lanen, and A. F. Langlykke. Jour. Bact. 54(2): 149-159. August 1947.

Of more than 350 fungi surveyed for their ability to produce alpha-amylase under submerged aerobic conditions of culture, only 7 produced substantial quantities of the enzyme. Cultures of *Rhizopus*, *Mucor*, *Penicillium*, *Aspergillus*, and *Monilia*, were studied, but only a few species of *Aspergillus* were potent amylase producers. The best of these were strains of *A. niger*. A strain of *Aspergillus niger* (NRRL 337) grew well on a medium composed of thin stillage supplemented with 2 percent of corn meal and 0.5 percent of calcium carbonate. Culture liquors so produced were active in saccharifying cereal grain mashes and could be used successfully to replace barley malt. It was found that a component of the enzyme mixture which was active in hydrolyzing maltose closely correlated with alcohol yields when the fungal enzyme was used as the saccharifying agent.

*DIRECT ESTERIFICATION OF GALLIC ACID WITH HIGHER ALCOHOLS

By Waldo C. Ault, James K. Weil, George C. Nutting, and J. C. Cowan. Jour. Amer. Chem. Soc. 69: 2003-2005. August 1947.

A procedure for the direct esterification of gallic acid with the higher normal aliphatic alcohols is described. Yields of lauryl gallate of the order of 70-80 percent of the theoretical yield (based on the gallic acid used) are obtained.

THE FLAVOR PROBLEM OF SOYBEAN OIL. I. A TEST OF THE WATER WASHING-CITRIC ACID REFINING TECHNIQUE

By Herbert J. Dutton, Helen A. Moser, and John C. Cowan. Jour. Amer. Oil Chem. Soc. 24(8): 261-264. August 1947.

The future of the soybean oil industry depends in part upon increasing the flavor stability of edible soybean oil. A procedure, which is reported to have been used by the German soybean oil refiners for combating flavor instability, has been tested on laboratory scale and appears to have distinct merit. Oils subjected to a particularly thorough degumming operation and to the subsequent addition of a small amount of citric acid during deodorization possess a significantly higher flavor stability than do those subjected to a conventional type of refining.

THE FLAVOR PROBLEM OF SOYBEAN OIL. II. ORGANOLEPTIC EVALUATION

By Helen A. Moser, Carol M. Jaeger, J. C. Cowan, and H. J. Dutton. Jour. Amer. Oil Chem. Soc. 24(9): 291-296. September 1947.
Methods for the organoleptic evaluation of soybean oil are presented. Problems in the selection of panel members, the design of experiments, the procedure of presentation of samples to the panel, and the statistical evaluation of results are discussed. By these methods, collected data can be translated into objective information which measures the flavor stability of samples of refined soybean oil. The efficacy of variants in refining procedures can be evaluated. Further improvements in taste methods appear possible.

SOY PROTEIN IN INDUSTRY--WHAT'S AHEAD?

By Allan K. Smith. The Soybean Digest 7(11): 28,29. September 1947.
The industrial utilization of soybean protein is discussed from the point of view of available supply, competition with other proteins, properties, present industrial uses, and probable future developments.

SOYBEAN RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY, 1946-47

By G. E. Hilbert. The Soybean Digest 7(11): 42,44,46,48. September 1947.
The Northern Regional Research Laboratory through vigorous pursuit of its researches has developed during this period new methods for precise determination of the composition of oils and oilseeds as well as new uses for soybean protein adhesive in the manufacture of shotgun-shell casings and has shown that the oil content of soybeans is maintained under commercial storage conditions and that the Chinese art for making soya sauce can be reduced to a scientific basis.

DIMETHYLENE-D-GLUCONIC ACID

By C. L. Mehltretter, R. L. Mellies, C. E. Rist, and G. E. Hilbert. Jour. Amer. Chem. Soc. 69(9): 2130-2131. September 1947.
Dimethylene-D-gluconic acid has been shown to contain methylene groups in acetal linkage in the 2,4 and 3,5 positions by oxidation to 2,4:3,5-dimethylene-D-glucosaccharic acid and conversion to the known dimethyl ester. The preparation of a number of new derivatives of 2,4:3,5-dimethylene-D-gluconic acid is described.

THE PREPARATION OF SOME SUGAR ACID DERIVATIVES OF SULFANILAMIDE

By C. L. Mehltretter. Jour. Amer. Chem. Soc. 69(9): 2133-2134. September 1947.

The synthesis of N^4-D-gluconylsulfanilamide, N^4-(2,3,4,5-diisopropylidene-2-keto-D-gluconyl)sulfanilamide, N^4-(2,3,4,6,-diisopropylidene-2-keto-L-gulonyl) sulfanilamide, N^4-(2-keto-D-gluconyl) sulfanilamide, N^4-(2-keto-L-gulonyl) sulfanilamide and 1-(4-sulfamylphenyl) pyrrole is described. None of these products has significant bacteriostatic properties.

CRYSTALLINE DERIVATIVES OF 6-α-D-GLUCOPYRANOSIDO-β-D-GLUCOSE FROM STARCH

By Edna M. Montgomery and F. B. Weakley, Corn Industries Research Foundation Fellowship, and G. E. Hilbert. Jour. Amer. Chem. Soc. 69(9): 2249-2250. September 1947.

Waxy corn starch (400 grams) was hydrolyzed with a purified amylolytic enzyme prepared from Aspergillus oryzae. From the non-fermentable fraction was isolated isomaltose in the form of a para-nitrobenzoate and two acetates. One of these acetates proved to be identical with 6-α-D-glycopyranosido-β-glucose derived from dextran hydrolyzates. This is the first time that a crystalline derivative of isomaltose has been isolated from starch hydrolyzates.

ANTIBIOTICS

By R. G. Benedict and A. F. Langlykke. Ann. Rev. of Microbiology pp. 193-236. Palo Alto, Calif. 1947.

This review covers certain phases of the contributions made within the past two years in the antibiotics field. The 76 named and 37 unnamed agents are produced by bacteria, actinomycetes, yeasts, molds, phycomycetes, besidiomycetes, algae, lichens, and higher plants. In general, the following factors are considered regarding each antibiotic: names of organisms or plants producing it; the chemical nature; types of organisms affected; and modes of action and toxicity to animals. There is one section on the mechanism of antibiotic action including a brief discussion of induced antibiotic resistance in microorgamisms. The literature citation has 209 references.

THE PRODUCTION OF CHINESE SOYA SAUCE

By Lewis B. Lockwood. The Soybean Digest 7(12): 10-11. October 1947.

A method for the production of Chinese soybean sauce is described. Rice cultures of Aspergillus oryzae, soybean broth cultures of Lactobacillus delbruckii, and a yeast, Zygosaccharomyces soyae or Hansenula sp., are added to a mixture of parched wheat and steeped, cooked soybeans. After incubating 3 or 4 days in 2-inch layers in pans, the mash is put into a deep vessel, covered with 20 percent brine, and allowed to ferment for 1 to 3 months at 37° C. The mash is then pressed, and the liquid is cleared with alum or kaolin, and filtered. About 2-1/2 gallons of sauce is obtained from 5 pounds of soybeans.

THE NORTHERN REGIONAL RESEARCH LABORATORY AND FLAX; PAST, PRESENT, AND FUTURE

By Allan K. Smith. Flax Facts, pp. E-1-E-7. October 1947.
A summary is given of the research program of the Northern Regional Research Laboratory covering various uses of the seed flax plant, and the probable course of future work. The subjects treated include isolation and utilization of flaxseed protein, flax shives, chemical modification of the oil, methods of oil analysis, and solvent extraction.

ACETYLATION OF ZEIN FIBERS

By Cyril D. Evans, C. Bradford Croston, and Cecil Van Etten. Textile Research Jour. 17(10): 562-567. October 1947.
The effect of acetylation on various properties of zein fibers has been investigated including studies establishing the conditions and factors for acetylation. A continuous process was developed using acetic anhydride-acetic acid reagent with sodium acetate as the preferred catalyst.

INTERPRETATION OF LIGNIN: THE SYNTHESIS OF GYMNOSPERM LIGNIN

By Alfred Russell. Science 106(2755): 372-373. October 17, 1947.
Examination of the analytical data accumulated over the past seventy years excludes the formulas previously proposed and leads to the conclusion that gymnosperm lignin is a poly-8-methoxydihydrobenzopyrone. The contention is confirmed by a facile synthesis of this product from vanillin.

DETERMINATION OF NITROGEN IN VEGETABLE OILS

By T. A. McGuire, F. R. Earle, and H. J. Dutton. Jour. Amer. Oil Chem. Soc. 24(11): 359-361. November 1947.
A method for the determination of nitrogen in vegetable oils is described. The procedure is based on concentrating the nitrogenous compounds into an aqueous phase by preliminary acid hydrolysis of a large sample of oil. After separation, the aqueous phase is digested and distilled with ordinary Kjeldahl equipment and the nitrogen determined with Nessler's reagent. With quantities of nitrogen as small as one part per million of oil, reproducibility is within plus or minus 10 percent, while for lesser amounts the method is only semi-quantitative. Data are presented on the nitrogen present in soybean oil after various refining procedures.

THE INDUSTRIAL UTILIZATION OF SUGARCANE BAGASSE

By E. C. Lathrop. Sugar Jour. 10(6): 5-7, 19-30. November 1947.
Several successful industrial uses for sugarcane bagasse have been

developed in this country, that have withstood the tests of competition. These uses are for the manufacture of a wide range of insulating building board products, special types of plastics, chicken litter, mulching material to replace sphagnum moss, and pith as a filler for certain types of explosives. The success of manufacturing ventures has been based on compliance with four fundamental principles: (1) Economic collection, handling, and storage of bagasse; (2) uses based on superior or unique properties; (3) maximum utilization of the raw materials; (4) sound merchandising and business management. It is pointed out that by adherence to these principles there is a strong possibility of developing other successful uses, such as manufacture of corrugating board, fine papers, sugars, furfural, solvents or liquid fuels from bagasse as a raw material.

PULPING WITH SODIUM SULPHITE TO PRODUCE STRAWBOARD

By S. I. Aronovsky, A. J. Ernst, and H. M. Sutcliffe. Paper Trade Jour. 125(19): 90,92,94. November 1947.

A series of experimental laboratory cooks were made on sound, combine wheat straw. Lime and caustic soda, sodium sulphite, and various combinations of lime and sodium sulphite were used as the pulping agents. The resultant pulps were evaluated for their strength properties and papermaking characteristics as described in a previously reported standardized procedure. The data obtained show that a mixture of 2 percent lime and 2 percent sodium sulphite, based on dry straw, produced an exceptionally free pulp which, when beaten and made into handsheets, had better strength characteristics and lower density than pulp similarly produced with the regular lime-caustic soda cooking agent.

THE OXIDATION OF LACTOSE AND MALTOSE TO BIONIC ACIDS BY "PSEUDOMONAS"

By Frank H. Stodola and Lewis B. Lockwood. Jour. Biol. Chem. 171(1): 213-221. November 1947.

Of 15 species of Pseudomonas examined for their ability to oxidize lactose to lactobionic acid, P. graveolens was found to best meet the requirements of rapid oxidation without enzymatic cleavage of the lactose. This organism gave a 75 percent yield of lactobionic acid in a rotating drum in 165 hours. In studies with maltose, P. graveolens again proved to be the best organism of 18 species tested. A yield of 77 percent maltobionic acid was obtained in a 50-hour fermentation. The purity of the crude calcium lactobionate and maltobionate obtained was over 90 percent in each case.

THE SMALL RURAL INDUSTRY--A STUDY OF THE POSSIBILITY OF MAKING INSULATING BOARD FROM STRAW. II. EXPERIMENTAL DEVELOPMENT--PLANT DESIGN AND OPERATION

By E. C. Lathrop, T. R. Naffziger, and R. V. Williamson. AIC-170. (Processed.) November 1947.

This is a companion publication to Circular No. 762, entitled, "The Small Rural Industry--A Study of the Possibility of Making Insulating Board from Straw." The development work leading to a rural industry process for manufacturing insulating building board from straw is described. Full details are presented for the location, design of special machinery, assembly and operation of the rural plant. Complete cost estimates are included. The bulletin contains a section on "Uses and Application Specifications" by Wallace Ashby and W. V. Hukill of the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S. Department of Agriculture. This bulletin will be available at the Northern Regional Research Laboratory to citizens who desire to consider undertaking manufacture by the process. The subject matter is highly technical and conferences may be arranged with the staff of the Northern Regional Research Laboratory to bring out by personal discussion and by pilot-plant demonstration a complete understanding of the project.

CEREAL CORE BINDERS OF VARIOUS TYPES STUDIED

By C. L. Mehltretter. The Foundry 75(12): 224,226. December 1947.

Core binders prepared from heat-gelatinized wheat, rye, and barley starches and flours have been found to impart good green bend strength to core sand mixtures. Baked strength values were satisfactory for only the rye and wheat starches and flours.

SOYBEAN STALKS FOR PAPER

By S. I. Aronovsky. The Soybean Digest 8(2): 10-11. December 1947.

Soybean stalks and their paper-making characteristics are discussed briefly. A satisfactory paper cannot be made from soybean stalk pulp alone. A small amount of soybean stalk pulp can be used with cereal straw pulp in the production of corrugating strawboard.

AGRICULTURAL RESIDUE FIBERS FOR GAS MASK FILTERS

By S. I. Aronovsky. G. H. Nelson, and E. C. Lathrop. Paper Indus. and Paper World 29(9): 1300-1303. December 1947.

The preparation and use of alpha-cellulose from rice and barley straw as a blending agent with spruce alpha-sulfite pulp for the manufacture of filter pads in civilian gas masks is described.

PATENTS

Copies of patents may be purchased from
The United States Patent Office
Washington, D. C.

INTERNAL SURGICAL DRESSING
Claude W. Rice and Majel M. MacMasters. U.S. Patent No. 2,423,475. July 8, 1947. (Assigned to Secretary of Agriculture.)

METHODS FOR PRODUCTION OF INCREASED YIELDS OF PENICILLIN
Robert D. Coghill and Andrew J. Moyer, U.S. Patent No. 2,423,873. July 15, 1947. (Assigned to Secretary of Agriculture.)

METHOD FOR THE PRODUCTION OF RIBOFLAVIN BY CANDIDA FLARERI
Fred W. Tanner, Jr., and J. M. Van Lanen. U.S. Patent No. 2,424,003. July 15, 1947. (Assigned to Secretary of Agriculture.)

TERTIARY AMINO PENTANOLS AND ESTERS THEREOF
Samuel A. Morell. U.S. Patent No. 2,424,184. July 15, 1947. (Assigned to Secretary of Agriculture.)

CROWN CLOSURES
Samuel I. Aronovsky, William F. Talburt, and Elbert C. Lathrop. U.S. Patent No. 2,427,699. September 23, 1947. (Assigned to Secretary of Agriculture.)

PROCESS OF MAKING LINEAR SUPERPOLYESTERS
John C. Cowan and Donald H. Wheeler. U.S. Patent No. 2,429,219. October 21, 1947. (Assigned to Secretary of Agriculture.)

A METHOD FOR PRODUCING ETHYL ALCOHOL
Lynferd J. Wickerham. U.S. Patent No. 2,431,004. November 18, 1947. (Assigned to Secretary of Agriculture.)

METHODS FOR THE ISOLATION OF PENICILLIN
Jacques L. Wachtel. U.S. Patent No. 2,432,638. December 16, 1947. (Assigned to Secretary of Agriculture.)

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LIST OF PUBLICATIONS AND PATENTS

JANUARY - JUNE 1948

NORTHERN REGIONAL RESEARCH LABORATORY, PEORIA, ILLINOIS

Bureau of Agricultural and Industrial Chemistry
Agricultural Research Administration
United States Department of Agriculture

PUBLICATIONS

Publications marked (*) are not available for distribution.

SOLVENT EFFECTS ON THE PRODUCTS OF SOYBEAN OIL EXTRACTION

By A. C. Beckel, P. A. Belter, and A. K. Smith. Jour. Amer. Oil Chem. Soc. 25(1): 7-9. January 1948.

Ethanol, isopropanol, isobutanol, ethylene dichloride, trichloroethylene, carbon tetrachloride, and hexane (b.p. range 30° to 60° C.) were used as solvents for the extraction of soybean oil. The comparative effect of the solvent on the color and other properties of the oil, meal, and isolated protein was measured. Ethanol extraction gave the best results with respect to the color of the oil, meal, and protein, and it also served as a debittering agent for the soybean meal.

*THE NONDISTILLATION ALCOHOL EXTRACTION PROCESS FOR SOYBEAN OIL

By A. C. Beckel, P. A. Belter, and A. K. Smith. Jour. Amer. Oil Chem. Soc. 25(1): 10-11. January 1948.

Development of an ethanol extraction process for soybean oil, which eliminates the distillation steps formerly required for the recovery of residual oil and byproducts, has been achieved, both in a continuous laboratory apparatus and on a pilot-plant scale. The elimination of these distillation steps and those necessary for rectification and dehydration removes the economic disadvantage occasioned by the high latent heat of ethanol as compared with hexane. Theoretical calculations of this process have shown an economic advantage in the use of ethanol in solvent extraction of soybean oil through lower energy requirements than when hexane is used. Consideration of improved products or additional byproducts which may be obtained is no longer fundamental.

THE STORAGE OF CORNCOBS AND OTHER AGRICULTURAL RESIDUES FOR INDUSTRIAL USE

By J. W. Dunning, P. Winter, and D. Dallas (Synthetic Liquid Fuels Project). Agr. Engin. 29(1): 11-13, 17. January 1948.

There are a number of locations in the United States where agricultural residues accumulate in sufficiently large quantities to serve as raw materials for industrial-scale chemical plants. It is shown that the decomposition of pentosans and cellulose in corncobs stored outdoors is negligible up to 6 months of storage. It is concluded that the construction of large storage buildings at a site of a plant which utilizes 50,000 to 100,000 tons of cobs a year is uneconomical insofar as protecting the cobs from the weather is concerned.

RAPID ESTIMATION OF MOISTURE OF STRAW IN BALES

By S. I. Aronovsky and H. M Sutcliffe. Paper Trade Jour. 126(3): 51-54. January 1948.

A preliminary study was made of a rapid method of determining the moisture content of straw in bales by means of an instrument based on the electrical-resistance principle. The results obtained on testing 13 commercial bales of several types of straw indicate that this instrument is fairly accurate up to 15 percent moisture and sufficiently accurate for field use for moisture content up to 25 percent Beyond 25 percent moisture the instrument has only a qualitative value. With bales of high moisture content the values obtained with this instrument were generally high.

HYDROLYSIS OF THE AMYLOPECTINS FROM VARIOUS STARCHES WITH BETA-AMYLASE

By John E Hodge, Edna M. Montgomery, and G. E Hilbert. Cereal Chem. 25(1): 19-30. January 1948.

The amylopectin or branched-chain fractions of corn, wheat, white potato, sweetpotato, and tapioca starches were isolated and degraded by beta-amylase to the limit dextrins. The extent of conversion to maltose, phosphorus content, alkali lability, iodine sorption, specific optical rotation, and properties of the triacetate derivatives were determined for both the amylopectins and limit dextrins. Evidence was found for the existence in some starches, particularly those of corn and sweetpotato, of a fraction intermediate in the extent of branching between amylose and the average for amylopectin.

*STRUCTURE AND SYNTHESIS OF GYMNOSPERM LIGNIN

By Alfred Russell. TAPPI Monograph Series No. 6, ch. X, pp. 220-234. 1948.

A study of the analytical work carried out on spruce lignin over the past 70 years makes it clear that the only cleavage products given by spruce lignin are vanillin, derivatives of vanillin, or simple degradation products of these. After so much work as has been done, it is in the highest degree unlikely that any radically different decomposition products will be found. Based on the evidence of the fission products it is inferred that the lignin is a poly-8-methoxydihydrobenzopyrone in equilibrium with its open chain analogue. The inference may be extended to considering the polymeric chain consisting of open and closed monomeric residues. The synthesis of such a polymeric material has been accomplished by Fries' rearrangement of vanillin monoacetate. So far as exact comparison of amorphous materials is possible, the properties of the synthetic product are in agreement with those of spruce lignin.

STARCH FROM "ALSTROEMERIA"

By M. J. Cox and M. M. MacMasters. Herbertia 14: 71-80. 1948.

Starches were prepared by a laboratory method from the tuberous roots of _Alstroemeria chilensis_ and _A. aurantiaca_. The granules of the former are chiefly simple, while those of the latter are compound. Granule size, gelatinization temperature, nitrogen and ash content, and iodine-sorptive capacity were determined. _Alstroemeria_ starch was found to be similar to tapioca starch in paste characteristics.

*RESEARCH IN THE DEVELOPMENT OF PENICILLIN

By Kenneth B. Raper. Pages 723-744 of book entitled "Advances in Military Medicine." Vol. II, Chapter LIII. Pub. by Little, Brown and Company. 1948. Boston.

A brief account of the research which led to the large-scale commercial production of penicillin during World War II is presented, particular attention being given to the outstanding achievements made by the U. S. Department of Agriculture's Northern Regional Research Laboratory. Topics discussed include (1) historical background; (2) development of the corn steep-lactose production medium; (3) development of submerged fermentation; (4) assay methods; (5) development of improved penicillin-producing molds; (6) chemistry of penicillin; and (7) others

THE FLAVOR PROBLEM OF SOYBEAN OIL. III. A FOUR-SAMPLE, GLASS LABORATORY DEODORIZER

By Arthur W. Schwab and Herbert J. Dutton. Jour. Amer. Oil Chem. Soc. 25(2): 57-59. February 1948.

An all-glass laboratory deodorizer has been described which permits the simultaneous deodorization of four samples under nearly identical conditions of time, temperature, pressure, and rate of steam flow. In addition, advantages other than those inherent to all-glass construction include: provision to measure and vary steam flow, improvements in methods of preventing bumping, of breaking the vacuum, and of heating and cooling the deodorizer.

MODIFICATION OF AN AGAR DIFFUSION METHOD OF ASSAY FOR POLYMYXIN

By R. G. Benedict and F. H. Stodola. Jour. Bact. 55(2): 286. February 1948.

An agar diffusion method of assay for the antibiotic polymyxin, was developed by Stansly and Schlosser, who employed _Escherichia coli_ as an assay organism. When _Brucella bronchiseptica_, NRRL B-140, is used, the time required for the assay is 6 to 8 hours less, and the edges of the zones of inhibition are more distinct than are those obtained with _Esch. coli_.

INTERRELATIONS AMONG FACTORS INFLUENCING THE OIL CONTENT OF CORN

By A. M. Brunson, F. R. Earle and J. J. Curtis. Jour. Amer. Soc. Agron. 40(2): 180-185. February 1948.

It has been found that the percentage of oil in the germ of the corn kernel is highly correlated with total oil in the kernel and that the ratio of germ oil to total oil in the kernel is highly correlated with the relative size of the germ. The study indicates that the amount of commercially recoverable oil (only the germ oil is recoverable under present processing methods) can be estimated with considerable accuracy by determining the amount of oil in the entire kernel, and also that selection for large germ is a satisfactory method of selecting strains with high oil content. The size of kernel was shown to have relatively little influence on composition of the samples studied.

HYDROLYTIC TREATMENT OF SOYBEAN PROTEIN WITH PAPAIN

By Vernon L. Johnsen and Allan K. Smith. Cereal Chem. 25(2): 77-86. March 1948.

Various factors which influence the hydrolytic treatment of soybean protein with papain have been investigated. These factors included hydrogen ion concentration, concentration of the enzyme, effect of activators and deactivators, and temperature.

INTERPRETATION OF LIGNIN. I. THE SYNTHESIS OF GYMNOSPERM LIGNIN

By Alfred Russell. Jour. Amer. Chem. Soc. 70(3): 1060-1064. March 1948.

Examination of the analytical data accumulated over the past 70 years excludes the formulas previously proposed and leads to the conclusion that gymnosperm lignin is a poly-8-methoxydihydrobenzopyrone. The contention is confirmed by a facile synthesis of this product from vanillin.

METHYL 2,4:5,6-DIMETHYLENE-D-GLUCONATE

By C. L. Mehltretter, R. L. Mellies, and C. E Rist. Jour. Amer. Chem. Soc. 70(3): 1064-1067. March 1948.

Methyl 2,4:5,6-dimethylene-D-gluconate is obtained upon heating methyl 2,4:3,5-dimethylene-D-gluconate in vacuo at 150°. Proof of the structure of this compound demonstrates the rearrangement of a six-membered methylene acetal ring to a five-membered ring. Application of the procedure of Hann and associates for the limited acetolysis of the methylene acetals of sugar alcohols to methyl 2,4:3,5-dimethylene-D-gluconate and methyl 2,4:5,6-dimethylene-D-gluconate resulted in further confirmation of the relative stability of the 2,4-methylene acetal linkage to acetolysis.

PRODUCTION OF MALTOSE SIRUPS FROM GRANULAR WHEAT FLOUR

By Aaron Efron and R. H. Blom. Indus. and Engin. Chem. 40(3): 412 March 1948.

Experimental work is described concerning the preparation of maltose sirups from granular wheat flour which involves extracting the flour with water prior to conversion. Several conversion agents were tested and the effects of these materials on the quality of the converted liquors are reported. The filtration of wheat mashes converted with enzymes is difficult and various processing techniquex were investigated in order to improve this rate. Bentonite was employed in the refining of maltose sirups and appears to have a strong affinity for wheat protein.

WATER SORPTION BY CORN STARCH AS INFLUENCED BY PREPARATORY PROCEDURES AND STORAGE TIME

By N. N. Hellman and E. H. Melvin. Cereal Chem. 25(2): 146-150. March 1948.

Measurements were made of the amount of water sorbed by 10 corn starches in equilibrium with atmospheres of different relative humidity ranging from 11 to 93 percent. The 10 starches differed among themselves with respect to origin, concentration of sulfur dioxide in the steep water at the time of extraction, drying, and time of storage. Despite these differences in preparation, all 10 starches showed essentially the same moisture sorption. It was concluded that data secured in studies of the moisture-sorptive properties of a single corn starch can be applied generally to normally prepared unmodified corn starches.

GASIFICATION OF AGRICULTURAL RESIDUES

By James C. Porter and Richard Wiebe. AIC-174. 5 pp. Illus. (Processed.) March 1948.

Agricultural residues, such as corncobs, can be used as fuel in gas generators for the production of a gas suitable for internal combustion engines. Experiments show that such a gas has the same heating value as one obtainable from wood.

ADSORPTION ANALYSIS OF LIPIDS. II. THE FRACTIONATION OF SOYBEAN OIL AND DERIVED ETHYL ESTERS

By Catherine L. Reinbold and Herbert J. Dutton. Jour. Amer. Oil Chem. Soc. 25(4): 117-120. April 1948.

A rapid method of fractionating soybean glycerides and their ethyl esters by adsorption analysis on an aluminum oxide column is described. This method compared favorably with other methods of fractionation. A complete analysis for fat acids was calculated for each fraction from spectrophotometric and iodine value determinations.

ADSORPTION ANALYSIS OF LIPIDS. III. SYNTHETIC MIXTURES OF ETHYL STEARATE, OLEATE, LINOLEATE, AND LINOLENATE

By Herbert J Dutton and Catherine L. Reinbold. Jour. Amer. Oil Chem. Soc. 25(4): 120-124. April 1948.

The adsorption analysis of six binary mixtures composed of ethyl stearate, ethyl oleate, ethyl linoleate, and ethyl linolenate was studied on alumina columns. Distillation methods have been shown by other workers to fractionate the stearate-oleate system but not the oleate-linoleate system. Application of the adsorption analysis technique resulted in fractionation of all six systems including the oleate-linoleate mixture.

ULTRAVIOLET LIGHT-ABSORPTION OF ALKALI-TREATED SOLUTIONS OF CARBOHYDRATES

Duncan Macmillan and Eugene H. Melvin. Science 107(2783): 447-449. April 1948.

The reaction of starch and starch fractions in alkaline dispersion in the absence of air was studied. Absorption bands at 2820 Å in alkaline solution and at 2550 Å in acid solution were found to result from the reaction. This absorption is due to decomposition products formed during the reaction. The quantity of absorbing substance formed was found to depend on the molecular size and the molecular structure of the original material. As yet no quantitative relationship between molecular size and spectral absorption has been demonstrated.

THE MANUFACTURE OF STRAW PULP

By S. I. Aronovsky. Paper Indus. and Paper World, Pt. I, 30(1): 71-78. April 1948; Pt. II, 30(2): 244-251. May 1948.

The practicability of producing straw pulps for use in certain types of paper and boards is discussed. The large annual production of straw indicates no possibilities of straw scarcity in the foreseeable future--in contrast with the pulpwood situation. Improvements in the economic procurement and handling of straw and developments in technical and process control in the manufacture of strawboard are described. Data are presented to show the technological and economic feasibility of producing high yields of strong, easy-bleaching straw pulps for blending with other papermaking pulps in the manufacture of fine specialty papers.

CHEMICAL CHANGES IN STORED GRAINS--A SELECTED AND ANNOTATED BIBLIOGRAPHY
By Carol M. Jaeger. ACE-191, Supplement 2. 9 pp. (Processed.) May 1948.
An interim, non-exhaustive addition to the bibliography on "Chemical Changes in Stored Grains" by Carol M. Jaeger; ACE-191, 35 pp., processed, March 1943.

ALCOHOL FROM AGRICULTURAL SOURCES AS A POTENTIAL MOTOR FUEL
By G. E. Hilbert. O.P. 5499. 10 pp. (Processed.) May 1948.
Agriculture can be expected to play only a small role in meeting our future requirements for liquid fuels. It is evident that conversion to alcohol of any surplus grains that might develop in the future could easily be absorbed in the market for motor fuels. This market is so tremendous that a surplus would disappear, figuratively speaking, practically overnight. The possibility of accomplishing this without Government subsidization is very promising. Alcohol from dollar corn may well be competitive with gasoline if the alcohol is used by direct injection in automobiles, buses, and trucks. Factors favoring the application of this development are the declining rate of discovery of petroleum deposits, the increasing demand for petroleum products, the rising price of gasoline, and the trend to fabricating higher compression engines by the automotive industry. It can therefore be said that conversion of surplus grains to alcohol, although of minor significance in satisfying our over-all needs for liquid fuels, will nevertheless be of immeasurable importance not only in stabilizing our agricultural and national economy, but also in utilizing our resources to the best advantage.

RESUMÉ OF TECHNOLOGIC AND ECONOMIC POSITIONS OF CORN AND COMPETITIVE MATERIALS AS SOURCES OF INDUSTRIAL ALCOHOL
By P. Burke Jacobs. O.P. 5487. 10 pp. (Processed.) May 1948.
A discussion of the industrial alcohol situation as it bears on the use of agricultural commodities, principally corn, as a raw material source. Such factors as raw material prices, availability of raw materials to processing plants, stability of raw material supplies, competition among fermentation raw materials as well as from alcohol produced by other than fermentation processes, economic influences, and technological aspects are considered. The effect of synthetic production of methanol, isopropanol, and butanol isomers on the alcohol market is shown, as well as the effect of present synthesis of chemical derivatives from ethylene instead of from alcohol.

RECENT ADVANCES IN THE FERMENTATION FIELD

By Cecil T Langford. O.P. 5489. 7 pp. (Processed.) May 1948.
Two processes are described for the production of chemicals by fermentation in submerged cultures. One of these substances is riboflavin, the other a mold amylase which can be used to replace malt completely in the alcoholic fermentation of grain. A method developed in the laboratory whereby commercial yields of this vitamin, sometimes known as vitamin B_2 or vitamin G, can be obtained when the yeast *Ashbya gossypii* is cultured in a medium containing 2 percent glucose, 0.75 percent corn steep liquor solids, and 0.75 percent animal stick liquor solids, is described. Preliminary results of pilot-plant development of the process are discussed. The ability of more than 350 fungi to produce amylase when grown under submerged aerobic conditions was determined. Good yields of a starch-saccharifying amylase were produced by a strain of *Aspergillus niger*. The amylolytic liquor, prepared and utilized on a pilot plant scale, has given yields of alcohol equal to or slightly higher than those obtained when malt is used as a conversion agent. The cost of the liquor is estimated to be about 2.4 cents per gallon of alcohol produced.

INDUSTRIAL UTILIZATION OF CORN CROP RESIDUES

By E. C. Lathrop. O.P. 5485. 18 pp. (Processed.) May 1948.
Chemurgic Digest 7(6): 20-26. June 1948.
The total dry residues from the corn crop amount to about 100 million tons annually; of this, 80 million tons are stalks, leaves, shucks, tassels, and 20 million tons cobs. Farm and industrial utilization of tassels, leaves, stalks, shucks, and cobs are discussed. Tassels, leaves, shucks, and cobs have feed value. Leaves have fertilizer value. About 200,000 tons of cobs are finding use annually for the manufacture of furfural, soft-grit blasting, burnishing, and polishing materials, chicken litter, and other uses. Practical methods for collection, handling and storing cobs, both from elevator and farm shelling operations, have been worked out. Cornstalks find no industrial use because no economical methods exist for their collection and storage. They would be suitable under certain conditions for the manufacture of insulating building materials, 9-point corrugating board, and fine paper pulps. Until the agricultural engineer and farm equipment manufacturers develop satisfactory machines and methods for collecting stalks, no industrial usage is to be expected. The possible use of cobs as a raw material for making sugars, furfural and liquid fuels is discussed.

FACTS ABOUT THE INDUSTRIAL UTILIZATION OF STRAW

AIC-189. 7 pp. (Processed.) May 1948.
This leaflet is in answer to many questions directed to the Laboratory concerning recent technical advances that have resulted from research on the utilization of straw and which make possible a large expansion of the market for this farm commodity. An over-all view of the various aspects of the situation is treated as a series of related paragraphs

under the following heads: The Situation, Today's Straw Market Tomorrow's Markets, The Shortage of Straw, Straw Collection as a Farming Practice, The Potential Straw Supply, What is Being Done, Standards for Baled Straw, and Future Prospects. Names and addresses of strawboard mills in the United States is included, together with a table showing the annual production of straw in six Midwestern States, and the amounts of straw recoverable, used on farms, and the portion unused or burned which might be utilized industrially.

BOOSTING ENGINE PERFORMANCE WITH ALCOHOL-WATER INJECTION

By J. C. Porter, W. B. Roth, and Richard Wiebe. Automotive Indus. 98(8): 34-37. May 1948.

The use of alcohol-water injection with low octane fuel in high (up to 9:1) compression ratio automobile engines has been studied with particular attention devoted to the role of alcohol. The advantages of injection, and particularly alcohol injection, are shown by performance curves from laboratory tests at part and full throttle.

POLYMERIZATION OF DRYING OILS. III. SOME OBSERVATIONS ON REACTION OF MALEIC ANHYDRIDE WITH METHYL OLEATE AND METHYL LINOLEATE

By H. M. Teeter M. J. Geerts, and J. C. Cowan. Jour. Amer. Oil Chem. Soc. 25(5): 158-162. May 1948.

The reaction of maleic anhydride with monomeric distillate from the preparation of polymeric fat acids yielded a mixture of oleic and linoleic adducts which, when reacted with ethylene diamine, yielded a polymer which gelled at a low degree of reaction. From the adduct of methyl linoleate with maleic anhydride, a polymeric substance having an approximate molecular weight of 950 was isolated. This polymer may cause the rapid gelation in polyamide formation, since the adduct of methyl oleate and maleic anhydride gave a soluble polyamide.

ACTION OF MOLD ENZYMES IN STARCH SACCHARIFICATION

By Julian Corman and A. F Langlykke. Cer. Chem. 25(3): 190-201. May 1948.

The carbohydrase system of mold culture filtrates was found to consist essentially of fungal alpha-amylase and maltase; beta-amylase apparently was absent. Starch saccharification efficiency was correlated more closely with maltase activity than with alpha-amylase potency.

VOLATILE LOSS IN MOLDING LIGNOCELLULOSE-FILLED PHENOLICS

By R. V. Williamson. Mod. Plastics 25(9): 126-127. May 1948.

The volatile loss in molded lignocellulose-filled phenolics was reduced but not eliminated by preheating the molding powder, because volatile matter was produced during the molding operation. Volatile loss was increased by the length of time of molding at a given temperature and by molding at higher temperatures for the same length of time. Minimum volatile loss was obtained by maximum preheating of the molding powder combined with minimum time of molding.

DENSITIES AND LIQUID-VAPOR EQUILIBRIA OF THE SYSTEM ETHANOL-ISOOCTANE (2,2,4-TRIMETHYLPENTANE) BETWEEN 0° AND 50°

By Carl B. Kretschmer, Janina Nowakowska, and Richard Wiebe. Jour. Amer. Chem. Soc. 70(5): 1785-1790. May 1948.

Densities and vapor pressures of ethanol and isooctane were measured at 0°, 25°, and 50° C. Equations giving the densities of these liquids as a function of temperature are presented. Densities, vapor pressures and vapor compositions of ethanol-isooctane solutions were measured at 0°, 25°, and 50°. The expansion on mixing was several parts per thousand and increased rapidly with temperature. The vapor pressure measurements are in satisfactory accord with requirements of the theoretical Duhem-Margules' equation. The heat, free energy, and entropy of mixing were calculated from the results.

4,4' DICHLORODIBUTYL ETHER AND ITS DERIVATIVES FROM TETRAHYDROFURAN

By Kliem Alexander and L. E. Schniepp. Jour. Amer. Chem. Soc. 70(5): 1839-1842. May 1948.

A method is described for the conversion of tetrahydrofuran to 4,4-dichlorodibutyl ether in 65 to 70 percent yields. The preparations of dihydroxy-dibutyl and diamyl ethers, diaminodiamyl ether, oxydivaleronitrile, oxydivaleric acid and its esters, and dialkoxydibutyl ethers from 4,4'-dichlorodibutyl ether are described.

AGRICULTURAL RESIDUE PULPS - COMPARISON OF PULPING PROCESSES

By S. I. Aronovsky, A. J. Ernst, H. M. Sutcliffe, and G. H. Nelson. Paper Trade Jour. 126(26): 78-83. June 1948.

A series of cooks was made on wheat straw by the soda, kraft, neutral sulfite, ammonia, magnesium acid sulfite and ammonium acid sulfite processes, under uniform pulping conditions. The data are given in 10 tables and illustrated in two graphs. In considering the alkaline processes it is shown that each of these processes possesses some advantage over the others in the production of pulps from wheat straw. The largest pulp yields were produced by the neutral sulfite process and the smallest by the soda process, with the kraft pulp yields somewhat larger than those produced by soda pulping. However, the strength characteristics were in the reverse order, with the soda pulps being the strongest, followed by the kraft and then the neutral sulfite pulps. The bleached agricultural residue pulps had better strength properties, with the exception of tensile strength, than the unbleached pulps, and the largest increase in strength on bleaching was evidenced by the neutral sulfite pulps.

THE ROLE OF LABORATORY NOTEBOOKS IN PATENT MATTERS

By Willard L. Cheesman. Jour. Pat. Off. Soc. 30(6): 438-449. June 1948.

A discussion showing the value of properly kept laboratory notebooks as valuable records in patent matters. There are many disadvantages to undue secrecy in developing inventions, and the establishment of adequate records is a more logical and effective means of protecting the interests of the inventor. Notebooks have special uses in patent prosecution such as in the corroboration of reduction to practice, analytical results, and accidental discoveries. They serve to assist in identifying the inventor and to dispel suspicion of fraud. Several illustrative court decisions are cited in the discussion of these special uses, and others are cited on the choice and proper use of corroborative witnesses.

THE SOYBEAN FROM THE STANDPOINT OF THE OIL MILLING INDUSTRY
By A. C. Beckel. Oil Mill Gazetteer 52(12): 43-46. June 1948.
Soybean research at the Northern Regional Research Laboratory, of particular interest to the oil milling industry, is summarized and its implication is discussed in reference to the future of the soybean and related industry. The summary includes the following recent developments: Study of flavor stability in soybean oil; the non-distillation solvent extraction process using ethyl alcohol; improvement of paint formulations using 100 percent soybean oil; development of new uses for soybean protein adhesive in the manufacture of shotgun shell casings; translation of the production of Norelac to the commercial scale; and the development of a proteinaceous material gelled irreversibly by heat.

LIST OF PUBLICATIONS--VEGETABLE OILS AND RELATED SUBJECTS
NM-300. 15 pp. (Processed.) 1948.
A brief bibliography of articles published during 1937-1946 on vegetable oils and related subjects.

LIST OF PUBLICATIONS--VEGETABLE OILS AND RELATED SUBJECTS
AIC-184. 2 pp. (Processed.) 1948.
A brief bibliography of articles published during 1947 on vegetable oils and related subjects.

LIST OF PUBLICATIONS--PROTEINS AND RELATED SUBJECTS
NM-301. 7 pp. (Processed.) 1948.
A brief bibliography of articles published during 1938-1947 on proteins and related subjects.

PATENTS

(Assigned to the Secretary of Agriculture)

Copies of patents may be purchased from
The United States Patent Office
Washington, D. C.

POLYAMIDES FROM POLYOCTADECAPOLYENYLAMINE
Howard M. Teeter and John C. Cowan. U.S. Patent No. 2,435,478. February 3, 1948.

PROCESS OF MAKING d-SACCHARIC ACID
Charles L. Mehltretter. U.S. Patent No. 2,436,659. February 24, 1948.

PLASTICIZED PROLAMINE COMPOSITION
Cyril D. Evans and Ralph H. Manley. U S. Patent No. 2,437,946. March 16, 1948.

PROCESS FOR THE PURIFICATION OF ACETIC ACID BY AZEOTROPIC DISTILLATION
Lester E. Schniepp. U.S. Patent No. 2,438,300. March 23, 1948.

METHOD FOR PRODUCTION OF PENICILLIN
Andrew J. Moyer. U.S Patent No. 2,422,141. May 25, 1948.

FOOD PRODUCTS AND METHOD OF MAKING THEM
Majel M. MacMasters and Guido E. Hilbert. U.S. Patent No. 2,442,928. June 8, 1948.

METHOD FOR PRODUCTION OF PENICILLIN
Andrew J. Moyer. U.S. Patent No. 2,443,989. June 22, 1948.

FERMENTATION PROCESS FOR PRODUCTION OF α-KETOGLUTARIC ACID
Lewis B. Lockwood and Frank H. Stodola. U.S. Patent No. 2,443,919. June 22, 1948.

SOY WHIP
Arthur C Beckel, Letta I. DeVoss, Paul A. Belter, and Allan K. Smith. U.S. Patent No. 2,444,241. June 29, 1948.

CORK SUBSTITUTE AND A PROCESS FOR ITS PRODUCTION
Elbert C. Lathrop and Samuel I. Aronovsky. U.S. Patent Reissue No. 23,012. June 29 1948. Reissue of U.S. Patent No. 2,433,849. January 6, 1948.

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Agricultural Research Administration
United States Department of Agriculture

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PUBLICATIONS

Publications marked (*) are not available for distribution.

ALCOHOLIC EXTRACTION OF OIL FROM SOYBEANS
By Arthur C. Beckel. AIC-196. 5 pp. (Processed.) July 1948.
[To be published in Soybean Digest.]
A short discussion of the alcoholic extraction of soybeans is given which includes (1) the impetus given to the study of solvent extraction by the requirement of a light-colored protein, (2) a brief reference to the history of alcohol extraction, (3) an explanation of the reason for the superiority of alcohol as a solvent, and (4) a discussion of the non-distillation alcohol extraction process.

COMPOSITION AND ITS EFFECTS ON THE PRICE OF SOYBEANS AND SOYBEAN OIL
By R. T. Milner. AIC-201. 6 pp. (Processed.) July 1948.
[To be published in Soybean Digest.]
Soybean oil is so much more valuable than the oil meal that the analysis of oil content is of extreme importance in determining the value of soybeans. An investigation of "quick" methods for oil determination shows none are accurate enough and that even the present official method needs improvement. The present methods of analyzing soybean oil are being improved and a proposed new refining method is discussed. The importance of careful settling or "cleaning" of soybean oil is emphasized.

DEVELOPMENTS IN SOYBEAN RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY
By J. C. Cowan. AIC-200. 5 pp. (Processed.) July 1948.
[To be published in Soybean Digest]
A review of certain types of research at the Northern Regional Research Laboratory on soybeans. Four of the important developments in the past 10 years in this field are discussed briefly.

EDIBLE SOYBEAN OIL
By Herbert J. Dutton. AIC-198. 4 pp. (Processed.) July 1948.
[To be published in Soybean Digest.]
A short review of the problem of flavor stability of soybean oil is given, with emphasis on the work in this field conducted at the Northern Regional Research Laboratory. The influence of processing methods and the value of adding metal scavengers is discussed, and methods of testing for flavor stability of soybean oil are discussed.

FOOD USES FOR SOYBEAN PROTEIN

By A. K. Smith. AIC-197. 4 pp. (Processed.) July 1948.

A review of the possibilities for increased use of soybeans as a protein source in the American diet and a discussion of the factors influencing consumer acceptance of soybean food products.

FRACTIONATION OF SOYBEAN OIL BY LIQUID-LIQUID EXTRACTION

By O. L. Brekke. AIC-194. 9 pp. (Processed.) July 1948.

[To be published in Soybean Digest]

The principle of the liquid-liquid extraction process of fractionating soybean oil, as employed in the pilot plant of the Northern Regional Research Laboratory, is explained. Diagrams of the equipment used are presented, operational steps described, and results, such as those in obtaining products having different iodine numbers that indicate soybean oil adaptability for various uses, are discussed.

PAINTS FROM SOYBEAN OIL

By A. J. Lewis. AIC-199. 3 pp. (Processed.) July 1948.

[To be published in Soybean Digest]

A discussion of the studies on the utilization of soybean oil as a vehicle in protective coatings.

A PILOT PLANT FOR SOLVENT EXTRACTION STUDIES

By R. H. Gustafsson. AIC-195. 7 pp. (Processed.) July 1948.

[To be published in Soybean Digest]

The pilot plant for studying solvent extraction of oilseeds at the Northern Regional Research Laboratory is described. The equipment in use is listed. The plant, designed for continuous operation, has a capacity of 40 pounds of soybeans per hour. The unit operations, consisting of cracking or crushing, dehulling, tempering, flaking, drying, extracting, desolventizing, and evaporating, are explained. The use of hexane, ethyl alcohol, and other solvents is discussed. Studies that have been proposed are briefly outlined.

BROMINATION OF METHYL ESTERS OF SOYBEAN FAT ACIDS AND METHYL LINOLEATE WITH N-BROMOSUCCINIMIDE

By Howard M. Teeter

Jour. Amer. Oil Chem. Soc. 25(7): 243-245. July 1948.

[To be published in Soybean Digest]

The bromination of methyl esters of soybean fat acids and of methyl linoleate by means of N-bromosuccinimide has been investigated. The effect of varying conditions of reaction has been studied. When brominated methyl esters of soybean fat acids were treated with sodium methoxide, sodium cyanide, or cuprous cyanide, reactions other than replacement occurred to a large extent.

POLYSACCHARIDE ARYL CARBAMATES

By Ivan A. Wolff and Carl E. Rist.

Jour. Amer. Chem. Soc. 70(8): 2779-2782. August 1948.

The reactions of a number of glucose-containing polysaccharides with phenyl isocyanate and with α-naphthyl isocyanate are described, and the properties of the resulting carbamate derivatives are discussed.

NEW ABRASIVE FOR HAND SOAPS

By T. F. Clark.

Soap and Sanit. Chem. 24(8): 41, 149, 151. August 1948.

A study to discover ingredients to replace corn meal as a slight abrasive in hand soaps discloses that the dense woody fraction of white corncobs is satisfactory if ground to pass a 30-mesh and be retained on an 80-mesh screen. Red cobs were unsatisfactory because of the discoloration resulting from the action of alkali in the soap. It is suggested that ground pecan and filbert shells, from which the inner paper-like lining has been removed, may also replace corn meal as the abrasive ingredient.

MIDWEST CHEMURGY

By G. E. Hilbert.

Chem. Engin. 55(9): 145-147. September 1948.

A brief discussion of how the development and growth of new and extended markets and outlets for midwestern farm commodities has been advanced. This has occurred largely in those processing industries which have utilized these commodities for the production of new or improved commercial products. Among the crops considered are corn, wheat, and soybeans; among the agricultural residues are corncobs and the straw of wheat and flax. Reference is made to a wide variety of commercial products derived from these commodities, and also to a number of individual processors who have been identified closely with the translation of these chemurgic developments to industrial application.

SOYBEAN RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY

By R. T. Milner.

The Soybean Digest 8(11): 31-32, 82. September 1948.

The current research program of the Northern Regional Research Laboratory on soybeans is reviewed with emphasis on the alcohol extraction process, the production of "Soyagel," an irreversible protein gel, the pilot plant for continuous solvent extraction, the work on lecithin, and the contract with the University of Pittsburgh on Research and Marketing Act funds.

BUTYL ALCOHOL FROM XYLOSE SACCHARIFICATION LIQUORS FROM CORNCOBS

By A. F. Langlykke, J. M. Van Lanen, and D. R. Fraser

Indus. and Engin. Chem. 40(9): 1716-1719. September 1948.

Xylose saccharification liquors obtained from corncobs in the first stage of a two-stage hydrolysis procedure may be fermented by a selected strain of butyl-alcohol-forming bacteria, if these liquors are supplemented by powdered iron, or if they are treated with activated charcoal prior to fermentation. Solvents production and distribution obtained in the fermentation of the xylose liquors were shown to be comparable to those obtained with glucose and molasses media.

QUANTITATIVE DETERMINATION OF HEMICELLULOSE CONSTITUENTS BY FERMENTATION

By A. H. Auernheimer, L. J. Wickerham, and L. E. Schniepp.

Analyt. Chem. 20(9): 876-877. September 1948.

The D-xylose and L-arabinose in hydrolyzates of hemicelluloses from agricultural residues can be quantitatively determined by fermenting solutions of the uronic acid-free sugars with *H. suaveolens* (NRRL No. 838) and *C. guilliermondii* (NRRL No. 488). *H. suaveolens* selectively utilizes D-xylose and *C. guilliermondii* utilizes both sugars completely. By determination of the copper reducing values of the unfermented and fermented samples the percentage of each sugar may be calculated.

AGRICULTURAL RESIDUE PULPS--HIGH-YIELD STRAW PULPS FOR FINE PAPERS

By S. I. Aronovsky, G. H. Nelson, A. J. Ernst, H. M. Sutcliff, and E. C. Lathrop.
Paper Trade Jour. 127(11): 154-162. September 1948; Tech. Assoc. Papers, Series 31: 291-299. June 1948.

The pulp and paper industry of this country is becoming increasingly interested in the possibilities of using agricultural residue pulps for fine papers. The neutral sulfite process described, giving high yields of relatively strong, easy bleaching pulps from agricultural residues, should partly overcome this disadvantage. Yields of 52 to 55 percent of screened pulp were obtained by cooking sound wheat straw with 8 percent sodium sulfite and 2 to 3 percent sodium carbonate on the basis of dry straw, for 2 hours at 170° C. (100 p.s.i.). The unbleached pulp had a maximum bursting strength (Mullen) of 85 to 95 points, a tensile strength at maximum Mullen of about 170 grams per ream pound, and a freeness (Schopper-Riegler) of 400 to 500 ml. The relatively low tear resistance of 40 to 60 grams per ream pound, due to the shortness of the wheat straw fiber, was somewhat greater than that found for hardwood soda pulp. Bleaching these neutral sulfite straw pulps to a brightness of 70 and above required 5 to 7 percent total chlorine and reduced the yields to approximately 49 to 53 of the original weight of dry straw. Bleaching also enhanced the strength properties of the pulps, particularly the bursting strength and folding endurance. This bleached neutral sulfite straw pulp should be completely satisfactory for blending with wood and other paper pulps in the production of fine specialty papers such as writing, book, magazine, and litho, as well as in art papers and bristol boards. The inclusion of the straw pulp in the furnish should result in lower beating and refining costs and in producing papers with better formation and improved strength and printing characteristics.

CARBON ASSIMILATION TESTS FOR THE CLASSIFICATION OF YEASTS

By Lynferd J. Wickerham and Kermit A. Burton.
Jour. Bact. 56(3): 363-371. September 1948.

By the addition of pure vitamins of the B-complex to liquid synthetic medium, it has been possible to obtain growth with many species of yeasts which formerly would not grow in the synthetic media used diagnostically in the nitrogen and carbon assimilation tests. The presently used medium permits growth by all except a few species. Only dextrose, galactose, maltose, sucrose, lactose, and raffinose have been commonly used in the past for assimilation tests. The present authors have made a survey of 70 carbon compounds in a search for other valuable compounds. The following were found useful: D-xylose, D-arabinose, L-arabinose, D-ribose, L-rhamnose, L-sorbose, i-erythritol, adonitol, dulcitol, D-mannitol, D-sorbitol, calcium 2-keto-D-gluconate, potassium 5-keto-D-gluconate, potassium-D-gluconate, cellobiose, melibiose, trehalose, melezitose, alpha-methyl-D-glucoside, salicin, inulin, soluble starch, succinic acid, DL-lactic acid, ethyl alcohol, glycerol, pyruvic acid, ethyl acetoacetate, i-inositol, and sodium potassium saccharate. The assimilation tests, as improved, are proving to be the most valuable type of biochemical test now available for the classification of yeasts.

THE ACTION OF HYDRAZINE HYDRATE ON OXAZOLONES.

By Frank H. Stodola.
Jour. Organic Chem. 13(5): 757-762. September 1948.

In connection with structure work on penicillin, it was found that, contrary to reports in the literature (Chem. Abst. 38 5500 (1944)), hydrazine hydrate and 2-phenyl-4-benzal-5-oxazolone react at room temperature to form α-benzoylaminocinnamic acid hydrazide and at 100° to give 3-phenyl-4-benzoylamino-5-pyrazolidone.

SOYBEAN PROCESSING MILLS IN THE UNITED STATES

CA-5. 14 pp. (Processed.) September 1948.

A list of the mills in this country which process soybeans to produce soybean oil and soybean meal.

PREPARATION OF SUCCINDIALDEHYDE AND ITS DERIVATIVES FROM FURAN

By Jorgen Fakstorp, Dolores Raleigh, and L. E. Schniepp.

Science 108(2803): 302. September 1948.

2,5-Diethoxy-2,5-dihydrofuran has been hydrogenated to 2,5-diethoxy-tetrahydrofuran, a cyclic acetal of succindialdehyde. This product was converted to succindialdehyde derivatives and to the free dialdehyde itself.

COMPARISON OF CORN STARCHES AT VARIOUS STAGES OF KERNEL MATURITY

By M. J. Wolf, M. M. MacMasters, J. E. Hubbard, and C. E. Rist.

Cereal Chem. 25(5) 312-325. September 1948.

The starch content of the kernel and the granule size, water-binding capacity, iodine-sorptive capacity, and light transmittancy characteristics of starches from three varieties of corn were studied at several stages during the development of the kernel from 12 to 13 days after pollination to maturity. The corn varieties investigated were Iowa 939 hybrid dent, Iowax 1 hybrid waxy dent, and Golden Cross Bantam sweet corn. The most rapid changes in starch characteristics occurred in the first 35 days after pollination. The relatively large proportion of small granules present in starch from immature corn may well tend to make the attainment of high starch yields difficult in commercial processing.

INFLUENCE OF PROTEOLYTIC ENZYMES AND YEAST NUTRIENTS UPON THE REQUIREMENT FOR MALT IN GRAIN ALCOHOL FERMENTATIONS.

By J. M. Van Lanen, E. H. LeMense, Abe Anellis, and Julian Corman.

Cereal Chem. 25(5): 326-336. September 1948.

This study shows that when grain mashes are converted with suboptimal amounts (4 to 5 percent) of malt, supplements of papain, ficin, or enzyme from *Bacillus subtilis* accelerate the subsequent fermentation. Also, the yield of alcohol is equivalent to that obtained with 8 to 10 percent of malt. Casein hydrolyzate and urea produce a similar result, and the effect is shown to be associated with improved nutrition of the yeast. The rate of fermentation can be increased by adding the same materials to the yeast seed cultures.

INTERPRETATION OF LIGNIN. II. THE SYNTHESIS OF FURTHER ANALOGS OF SPRUCE LIGNIN

By Alfred Russell.

Jour. Amer. Chem. Soc. 70(9): 2864-2865. September 1948.

The polymerization reaction used in the synthesis of a lignin from vanillin, and having the same structure as spruce lignin, was extended to the preparation of analogous polymeric materials from o- and P-hydroxybenzaldehydes.

NEW SPECIES OF PENICILLIUM

By Kenneth B. Raper and Dorothy I. Fennell.

Mycologia 40(5): 507-546. September - October 1948.

Eleven species and one variety of *Penicillium* are described as new. The new species include five ascosporic species, namely: *Penicillium parvum, P. levitum, P. helicum, P. rotundum* and *P. striatum*; one sclerotigenic species, *P. lapidosum*; and five non-ascosporic species and one variety, namely: *P. capsulatum, P. lavendulum, P. piceum, P. aculeatum, P. diversum,* and *P. diversum var. aureum.* The new species were isolated primarily from soil, or from deteriorating military equipment in tropical or subtropical areas. The latter are believed to be largely of soil origin.

COMPONENTS OF "SOYBEAN LECITHIN"

By C. R. Scholfield, H. J. Dutton, F. W. Tanner, Jr., and J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 25(10): 368-372. October 1948.

The acetone-insoluble material from "soybean lecithin" has been fractionated by submitting alcohol-soluble and alcohol-insoluble portions to countercurrent distribution between hexane and methanol. The approximate composition for one sample of soybean phosphatides is estimated to be 29 percent lecithin, 31 percent cephalin, and 40 percent inositol-phosphatides.

OIL FROM GRAIN

By Warren H. Goss.

AIC-208. 14 pp. illus. (Processed.) October 1948.

A revision of a paper, "Oil from Grain," by Warren H. Goss, presented at the twenty-ninth annual meeting of the Association of Cereal Chemists, St. Louis, Mo., May 1943, and published in Trans. Amer. Assoc. Cereal Chem. 2(2): 5-19. January 1944. The tables used in the publication include statistical data for the period 1941 through 1946, and mention is made of two new products that are made from vegetable oils and developed since 1943. Brief descriptions are given of the three methods commonly used for producing oil from soybeans, linseed, corn germ, wheat germ, and rice bran.

ELIMINATION OF NITRITE INTERFERENCE IN IODOMETRIC SUGAR DETERMINATIONS

By Julian Corman. Analyt. Chem. 20(10): 984. October 1948.

Since the presence of sodium nitrite interferes with iodometric sugar determinations, methods were studied for its elimination. It was found that the addition of an excess of urea and sulfuric acid removed the sodium nitrite completely.

THE STAKE OF PRIVATE BUSINESS IN GOVERNMENT-OWNED PATENTS

By Willard L. Cheesman.

Chem. and Engin. News 26(45): 3334-3336. November 1948.

A discussion of the value to the businessman of the inventions coming from Government laboratories. These inventions, owned by the public, require industrial exploitation before maximum benefit can be realized. By means of licenses under Government patents, private business can share in the benefits of public research and can have access to a wealth of current knowledge that may not be available from any other source.

USAGE OF SOYBEAN AND PHENOLIC GLUES IN THE SOFTWOOD PLYWOOD INDUSTRY

By Glen E. Babcock and John C. Cowan.

The Soybean Digest 9(1): 16, 17, and 45. November 1948.

A resumé of the utilization of soybean and phenolic resin glues in the softwood plywood industry is given, with emphasis on the recent shift in types of plywood produced and of the glues used.

PILOT PLANTS: REGIONAL RESEARCH LABORATORIES, U. S. DEPT. OF AGRICULTURE

By W. B. Van Arsdel, R. K. Eskew, E. A. Gastrock, and C. T. Langford.

Indus. and Engin. Chem. 40(11): 2014-2020. November 1948.

The four Regional Research Laboratories constructed by the U. S. Department of Agriculture in 1940-1941 contain areas designed for process research. During the past seven years these areas have been the scene of a wide variety of large-scale developments. The alterations, improvements, and special facilities that have grown out of this experience are discussed. Limitations on use of a single general area for diverse operations are pointed out. The authors summarize their experience with problems in housekeeping and maintenance, and in making proper provision for comfort and safety of the staff.

AN EXPLANATION OF SOME COMMON STATISTICAL TERMS

By Carol M. Jaeger.
The Brewers Digest 23(12): 140-143T. November 1948.
Various statistical measures used in classifying and interpreting groups of data are defined in terms understandable by non-statisticians, and the steps in computing some of these measures are shown by simple illustrations.

THE FLAVOR PROBLEM OF SOYBEAN OIL. IV. STRUCTURE OF COMPOUNDS COUNTERACTING THE EFFECT OF PROOXIDANT METALS

By Herbert J. Dutton, Arthur W. Schwab, Helen A. Moser, and John C. Cowan.
Jour. Amer. Oil Chem. Soc. 25(11): 385-388 (November 1948.)
A study has been made of the structure and activity of polycarboxylic acids and polyhydric alcohols which improve the stability of soybean oil. Certain generalizations have been made regarding the structural groups required and the possible mechanism of reaction.

PREPARATION AND CHARACTERIZATION OF DEXTRAN FROM LEUCONOSTOC MESENTEROIDES

By Allene Jeanes, C. A. Wilham, and J. C. Miers.
Jour. Biol. Chem. 176(2): 603-615. (November 1948)
A dependable source of supply of carbohydrate substances containing the unusual α-1,6-glucosidic linkage has been made available for use in comparative studies on the structure of starch. This has resulted from the establishment of conditions for the preparation of dextran with reproducible properties and of high quality from cultures of *Leuconostoc mesenteroides* NRRL B-512 on sucrose. The influence of pH, aeration, and incubation time on yield, viscosity, and other properties of dextran are presented.

MOLECULAR ASSOCIATION IN DEXTRAN AND IN BRANCHED AMYLACEOUS CARBOHYDRATES

By Allene Jeanes, N. C. Schieltz, and C. A. Wilham.
Jour. Biol. Chem. 176(2): 617-627. (November 1948.)
This paper reports a study on the association which develops between portions of the same or adjacent molecules in starch and related polysaccharides. Conditions were established under which glutinous cornstarch, corn amylopectin, and the dextran from *Leuconostoc mesenteroides* developed orderly molecular association, and the relation was determined between this association, X-ray diffraction powder patterns, and solubility. Data are presented on the typical X-ray diffraction powder patterns produced by crystalline dextran.

SUNFLOWER SEED PROTEIN

By Allan K. Smith and Vernon L. Johnsen.
Cereal Chem. 25(6): 399-406. (November 1948.)
A study was made of the isolation of sunflower seed protein from solvent-extracted meal by the alkaline extraction and acidic precipitation method.

ARYL CARBAMATE DERIVATIVES OF D-GLUCOSAN <1,5> β <1,6> AND OF 1,2-ISOPROPYLIDENE-D-GLUCOSE

By Ivan Wolff and Carl E. Rist.
Jour. Amer. Chem. Soc. 70(11): 3961. November 1948.
The following new compounds were prepared and characterized: levoglucosan tricarbanilate, levoglucosan tri-N-α-naphthylcarbamate, 1,2-isopropylidene-D-glucose tricarbanilate, and 1,2-isopropylidene-D-glucose-tri-N-α-naphthylcarbamate. The stability of the aryl carbamate grouping toward mild acid and alkaline reagents suggests the possible use of these esters in the preparation of selectively substituted glucose derivatives of known structure.

AN AUTOMATIC AGAR DISPENSER

By W. H. Schmidt, M. D. Reeves, Francis J. Castle, and R. G. Benedict.
Nature 162(4127): 903. December 1948.

Details of the construction and operation of an automatic agar dispenser are given, the device consisting of constant-head glass reservoir, a modified solenoid valve with a magnetic core for controlling a ball valve, and an electronic timer with micro switch. With this device,30 plates containing 20 milliliters of agar each can be poured within 3 minutes.

EVALUATION OF FIBROUS AGRICULTURAL RESIDUES FOR STRUCTURAL BUILDING BOARD PRODUCTS. I. METHODS AND EQUIPMENT

By E. C. Lathrop and T. R. Naffziger. Paper Trade Jour. 127(27): 55-60. December 1948; Tech. Assoc. Papers, Series 31: 337-343. June 1948.

Equipment and methods of evaluating agricultural residues for structural board manufacture are described. Data are presented on the correlation of physical tests on laboratory boards with commercial or 3' x 3' boards. The relationship of the moisture content of the board going into the drier and of the proportion of hydrated to unhydrated pulp used in producing the boards is shown to have direct bearing on the physical properties of the boards. The impact strength of boards is related to fiber length and stiffness. Boards made from properly prepared agricultural residue fibers have two or more times the impact strength of wood fiber boards. It is suggested that the incorporation of a proportion of agricultural residue fibers into commercial wood fiber boards would considerably improve their impact strength and increase their ruggedness.

REPUBLICATIONS

RAPID ESTIMATION OF MOISTURE OF STRAW IN BALES

By S. I. Aronovsky and H. M. Sutcliffe.
Paper Trade Jour. 126(3): 51-54. January 1948. Tech. Assoc. Papers, Series 31: 572-575. June 1948.

AGRICULTURAL RESIDUE PULPS--COMPARISON OF PULPING PROCESSES

By S. I. Aronovsky, A. J. Ernst, H. M. Sutcliffe, and G. H. Nelson.
Paper Trade Jour. 126(26): 78-83. June 1948. Tech. Assoc. Papers, Series 31: 299-304. June 1948.

PATENTS

(Assigned to the Secretary of Agriculture)

Copies of patents may be purchased from
the United States Patent Office
Washington, D. C.

BIOLOGICAL PROCESS FOR THE PRODUCTION OF RIBOFLAVIN
Fred W. Tanner, Jr., Lynferd J. Wickerham, and James M. Van Lanen.
U. S. Patent No. 2,445,128. July 13, 1948.

PROCESS OF EXTRACTION FROM VEGETABLE MATERIALS
Arthur C. Beckel, Paul A. Belter, and Allan K. Smith.
U. S. Patent No. 2,445,931. July 27, 1948.

VITAMIN B-COMPLEX CONCENTRATE
Fred W. Tanner, Jr. and James M. Van Lanen.
U. S. Patent No. 2,449,340. September 14, 1948.

PROCESS FOR SACCHARIFYING PLANT MATERIALS
John W. Dunning and Elbert C. Lathrop.
U. S. Patent No. 2,450,586. October 5, 1948.

POLYAMIDES FROM POLYMERIC FAT ACIDS
John C. Cowan, Lee Bert Falkenburg, Howard M. Teeter, and Philip S. Skell.
U. S. Patent No. 2,450,940. October 12, 1948.

PROCESS FOR PREPARING STARCH HYDROLYZING ENZYME WITH ASPERGILLUS
Elmer H. LeMense and James M. Van Lanen.
U. S. Patent No. 2,451,567. October 19, 1948.

POLYESTERS OF DIMETHYLENE D-GLUCONIC ACID
Charles L. Mehltretter.
U. S. Patent No. 2,453,150. November 9, 1948.

ALKALI PROCESS FOR WHEAT STARCH PRODUCTION
Robert J. Dimler.
U. S. Patent No. 2,445,981. December 14, 1948.

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August 12, 1949

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH ADMINISTRATION
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LIST OF PUBLICATIONS AND PATENTS
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Peoria, Illinois

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PUBLICATIONS

[Publications marked (*) are not available for distribution.]

GRAIN ALCOHOL FERMENTATIONS: SUBMERGED MOLD AMYLASE AS A SACCHARIFYING AGENT

By E. H. LeMense, V. E. Sohns, J. Corman, R. H. Blom, J. M. Van Lanen, and A. F. Langlykke
Indus. and Engin. Chem. 41 (1): 100-103. January 1949.

Experiments with submerged mold amylase as a saccharifying agent, designed to supply data on (1) type and concentration of enzymes produced in submerged fermentation under varying rates of aeration; (2) concentration and quantity of mold culture required to replace malt; (3) alcohol yields obtainable by the continuous use of fungal amylase for the saccharification and fermentation of corn; and (4) investment and operating costs for the production of fungal enzymes by the submerged process were conducted on a pilot-plant scale in conventional distillery equipment. Results showed that saccharification was satisfactory and alcohol yields were comparable to those obtained with malt when mold culture liquor equivalent to 6 to 10 percent of the final mash volume was used. The cost of the amylase was estimated at 6.06 cents per bushel of grain processed, as compared with 12.1 cents in the case of malt.

WHEAT STRAW FOR IMPROVED PAPER AND BOARD PRODUCTS

By E. C. Lathrop.
Pulp and Paper Mag. of Canada 50 (3): 167-178. Convention Issue February 1949.

The practicability of producing straw pulps suitable for various types of paper and board and of the results of cooperative efforts by the strawboard industry, the farm equipment industry, and the Northern Regional Laboratory for improvements in procurement of straw and in technical and process control of strawboard manufacture are discussed. Data are presented showing that the large annual straw production indicates no possibilities of straw scarcity in the forseeable future--in contrast with the pulpwood situation. Additional data show the technological and economic feasibility of producing high yields of strong, easy-bleaching straw pulps for blending with other paper-making pulps in the manufacture of fine specialty papers

and that no major changes in present pulp mill equipment are required to produce this straw pulp. The advantages of blending straw pulp with other paper-making pulps are discussed. Pilot-plant production of insulating building board from straw, by which a superior product is made by blending long-fibered straw pulp with regular lime-cooked pulp to form an insulating building board with increased ruggedness and particularly increased impact strength, is described. The increase in paper and board consumption, attendant upon the general raising of living standards the world over, is considered in its relation to increased utilization of annual crop residues.

EVALUATION OF FIBROUS AGRICULTURAL RESIDUES FOR STRUCTURAL BUILDING BOARD PRODUCTS. II. FUNDAMENTAL STUDIES ON WHEAT STRAW FIBER

By E. C. Lathrop and T. R. Naffziger
Tappi 32 (2): 91-96. February 1949.

A fundamental study of the relationship between the fiber properties of wheat straw and the physical characteristics of insulating boards made from it has led directly to the conclusion that wheat straw is highly suitable for the manufacture of meritorious products. Methods are described for cooking and refining wheat straw to produce mainly long fibers and also hydrated short fibers. A means of fractionating long straw fibers into various fiber lengths is also described. An analysis of the physical properties of insulating boards made from hydrated, filler, and selected long straw fiber has shown that long fibers favor the production of boards of flexural and tensile strengths higher, at any comparable densities, than wood fiber boards. The impact strength of such boards is two to three times that of boards made from wood fibers. Tensile strength of such wheat straw boards is directly related to hydrated fiber content, while impact strength is directly related to fiber length. However, fiber diameter may also play an important role in impact strength.

HYDROGENATION PRODUCTS FROM FURFURALACETOFURAN

By Kliem Alexander and George H. Smith, Jr.
Jour. Amer. Chem. Soc. 71 (2): 735-737. February 1949.

The chalcone-like compound, furfuralacetofural, was prepared in quantity and in excellent yield by condensation of furfural with 2-acetylfuran. The latter compound is conveniently available by reaction of furan with acetic anhydride in the presence of sirupy phosphoric acid. An approximate 80 percent over-all conversion of furfural to furfuralacetofuran is thus made possible. Procedures were developed for the stepwise catalytic hydrogenation of furfuralacetofuran to 1,3-difurylpropanone-1, 1,3-difurylpropanol-1, and 1,3-ditetrahydrofurylpropanol-1. These hydrogenation products were obtained in yields of 80 to 90 percent or better and characterized by preparation of several derivatives.

ISOMERIZATION REACTIONS OF DRYING OILS

By J. C. Cowan.
Indus. and Engin. Chem. 41 (2): 294-304. February 1949.

Isomerization reactions of vegetable oils are reviewed with reference to production of drying oils, to drying behavior, and to the evaluation of the isomerized oils.

THE TECHNICAL LITERATURE OF AGRICULTURAL MOTOR FUELS
By Richard Wiebe and Janina Nowakowska.
U.S. Dept. Agr. Bibliog. Bul. No. 10. 259 pp. February 1949.
This is a technical review, with citations and annotations, of the literature of agricultural motor fuels published throughout the world since 1920, including also a considerable number of papers published previous to that year. The subject matter is arranged and treated in 12 parts: (1) Methods of analysis--physical chemical, thermodynamic properties, corrosion studies, storage problems; (2) engine performance, bench, and road tests; (3) practical experience with power alcohol; (4) economics--statistics, raw materials, methods of manufacture, production and cost, legislation, national policy; (5) miscellaneous information on agricultural motor fuels; (6) vegetable oils--preparation of fuels and performance data; (7) patents; (8) books; (9) addendum; (10) index of authors; (11) index of subjects; and (12) list of technical publications.

*ORIENTAL USE OF SOYBEANS AS FOOD WITH SPECIAL ATTENTION TO FARMING PRACTICES.
I. CHINA
By Allan K. Smith.
The Soybean Digest 9 (4): 15-17. February 1949.
This is the first of five parts of a report on a trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. The author gives his observations on customs and food habits of the people, especially concerning their vegetarian diet. China, Japan, and Korea are dealt with separately. Included is information on farming conditions, customs, and oilseed production.

*ORIENTAL USES OF SOYBEANS AS FOOD WITH ATTENTION TO FERMENTED PRODUCTS.
II. CHINA
By Allan K. Smith.
The Soybean Digest 9 (5): 26-28, 30, 32, 34. March 1949.
This is Part II of a report on a trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. It contains information on production and uses of soy sauce, soybean or vegetable milk, soybean curd, soybean cheese, fermented soybeans, fen-t'iao from mung beans, and a vinegar fermentation process.

ABSTRACTS OF PATENTS GRANTED JUNE 1943 - DECEMBER 1948.
AIC-230. 9 pp. (Processed.) March 1949. Compiled by W. L. Cheesman.
A list of abstracted Northern Regional Research Laboratory Patents.

INTERPRETATION OF LIGNIN. III. THE SYNTHESIS AND POLYMERIZATION OF STABLE MONOMERS
By Alfred Russell, John H. Baity, and Herbert E. Smith.
Jour. Amer. Chem. Soc. 71 (3): 956-957. March 1949.
The synthesis of 2,4-dihydroxy-3-formylacetophenone, 2,4,6-trihydroxy-3-formylacetophenone, and 2,4,6-trihydroxy-3-formylacetophenone are described. These compounds were polymerized to lignin-like materials.

STUDIES ON THE PREPARATION OF SOYBEAN PROTEIN FREE FROM PHOSPHORUS

By L. L. McKinney, W. F. Sollars, and E. A. Setzkorn.
Jour. Biol. Chem. 178 (1): 117-132. March 1949.

This study was undertaken to determine the phosphorus content of soybean protein prepared by various known methods and to find a method of isolating "phosphorus-free" soybean protein suitable for fundamental studies. The phosphorus content of soybean protein was found to vary from 0.05 to 1.10 percent, depending upon the method of preparation. Substantially all of the phosphorus in soybean protein behaved as if it were of phytin origin. Phosphorus was nearly quantitatively removed by dialyzing saline extracts against 10 percent saline solution, followed by dialyzing against distilled water. The use of tap water in dialysis prevented the removal of phosphorus. Phytin dissociated from the protein in alkaline extracts at pH 11 and was removed by centrifugation.

REACTIONS OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. I. SOYBEAN OIL

By H. M. Teeter, R. C. Bachmann, E. W. Bell, and J. C. Cowan.
Indus. and Engin. Chem. 41(4): 849-852. April 1949.

The conditions for reaction and the nature of the products obtained in the reaction of methyl oleate and *tert.*-butyl hypochlorite were investigated. It is concluded that the reaction product contains an allylic chloride, a non-allylic chloride, and a saturated dichloride.

LIST OF PUBLICATIONS ON VEGETABLE OILS AND RELATED SUBJECTS, THE NORTHERN REGIONAL RESEARCH LABORATORY

AIC-184, Supplement 1. 2 pp. (Processed.) April 1949.

A list of Northern Laboratory papers and articles published during 1948 on vegetable oils and related subjects.

LIST OF PUBLICATIONS ON PROTEINS AND RELATED SUBJECTS, THE NORTHERN REGIONAL RESEARCH LABORATORY

AIC-228, Supplement 1. 2 pp. (Processed.) April 1949.

A list of Northern Laboratory papers and articles published during 1948 on proteins and related subjects.

AQUEOUS ZEIN DISPERSIONS

By C. W. Ofelt and C. D. Evans.
Indus. and Engin. Chem. 41 (4): 830-833. April 1949.

The dispersibility of zein in aqueous alkaline systems was investigated. Only the strong alkalies were found suitable as dispersing agents. The pH-dispersion curves, viscosity curves, and stability data are presented for these systems.

A NEW MECHANO-CHEMICAL PROCESS FOR PULPING AGRICULTURAL RESIDUES

By S. I. Aronovsky and E. C. Lathrop.
Tappi 32 (4): 145-149. April 1949.

A new process, developed at the Northern Regional Research Laboratory, for pulping agricultural residues involving combined and simultaneous chemical and mechanical action on the raw material at atmospheric pressure and at temperatures at or near

100° C. is described. Excellent strawboard pulps were produced by cooking wheat straw for 1 hour in a laboratory Hydrapulper, using the normal amounts of chemicals. Strong, easy-bleaching kraft straw pulps were made in a half-hour cooking period in this equipment. Re-use of the kraft black liquor from the Hydrapulper for three successive subsequent cooks had no appreciable effect on the yields or properties of the resulting pulps. The final black liquor contained more than 7 percent of organic matter. A possible explanation for the rapid pulping action in the Hydrapulper is given. The significance of these preliminary results and the advantages of this method of pulping are discussed. This mechano-chemical process might have considerable influence in increasing the use of agricultural residues for paper, board, and their products.

FORMALDEHYDE CURING OF ZEIN FIBERS

By Cyril D. Evans and C. Bradford Croston.
Textile Res. Jour. 19 (4): 202-211. April 1949.
Investigation of conditions necessary for the rapid formaldehyde curing of zein fibers has led to the development of a continuous two-stage curing process. The first stage (precuring) consists of a mild cure to introduce approximately 0.75 percent formaldehyde into the fiber and produces, after stretching, a fine-diameter fiber of exceptional strength and elasticity. The second stage (post curing) consists of a strong cure to introduce about 3.0 percent additional formaldehyde into the stretched fiber to stabilize its length. It was found that formaldehyde is bound under both alkaline and acid conditions, but only under acid conditions does any curing occur. When cured under highly acidic conditions (below pH 0), the fibers are stable to both acid and alkaline boiling.

*ORIENTAL USES OF SOYBEANS AS FOOD WITH ATTENTION TO FERMENTED PRODUCTS. III. CHINESE INSTITUTIONS

By Allan K. Smith.
The Soybean Digest 9 (6): 23, 24, 26, 28, 30, 31. April 1949.
This is Part III of a report on a trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. It deals with contacts and conferences and gives a brief description of China's research institutions, universities, and agricultural experiment stations.

*ORIENTAL USES OF SOYBEANS AS FOOD WITH ATTENTION TO FERMENTED PRODUCTS. IV. JAPAN

By Allan K. Smith
The Soybean Digest 9 (7): 24-26, 28, 30. May 1949.
This is Part IV of a report on a trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. Japanese agriculture is discussed with special reference to soybeans. Information is presented on the production and uses of miso, soy sauce, and monosodium glutamate. A discussion on trends in soy sauce production in the Orient is included.

EXTRACTION OF SOYBEAN PROTEIN WITH SULFUROUS ACID

By L. L. McKinney and W. F. Sollars.
Indus. and Engin. Chem. 41(5): 1058-1060. May 1949.
The extraction of protein from soybean meal with sulfurous acid was studied. Peptization curves show the percentage solubility of total nitrogen of hexane- and ethanol-extracted soybean meal in various concentrations of sulfurous acid solutions. The

curves are similar to those reported for hydrochloric acid. This similarity indicates the possibility of utilizing a mixture of sulfurous and hydrochloric acid to extract proteins, thus eliminating the need of a closed system which would be required if sulfurous acid alone were employed. Also, this mixture appears to be as effective in inhibiting nonenzymatic browning as sulfurous acid alone.

ALCOHOL FROM AGRICULTURAL SOURCES AS A POTENTIAL MOTOR FUEL

By G. E. Hilbert.

AIC-233. 7 pp. (Processed.) May 1949.

Based on a paper presented at the 1949 meeting of the National Council of Farmer Cooperatives, Memphis, Tenn., January 4, 1949. In part it is a revision of a paper of the same title presented at the Thirteenth Annual Meeting of the National Chemurgic Council, Omaha, Nebr., March 3-6 1948, and processed as OP 5499. 10 pp. May 1948. (See AIC-187, Supplement 1.)

LIQUID VAPOR EQUILIBRIUM OF ETHANOL-TOLUENE SOLUTIONS

By Carl B. Kretschmer and Richard Wiebe.

Jour. Amer. Chem. Soc. 71 (5): 1793-1797. May 1949.

In continuation of this Laboratory's program of determining the physical properties of ethanol-hydrocarbon mixtures, densities at 25° C. and vapor pressures and compositions at 35° and 55° have been measured for solutions of ethanol and toluene. The heat and entropy of mixing have been calculated from these data. A simple empirical equation has been developed which represents the liquid-vapor equilibrium of alcohol-hydrocarbon mixtures quite accurately. Constants in this equation are presented for ethanol-toluene solutions and a number of systems previously investigated.

ISOLATION OF 6-[α-D-GLUCOPYRANOSYL]-D-GLUCOSE (ISOMALTOSE) FROM HYDROLYZATES OF STARCH

By Edna M. Montgomery, F. B. Weakley, and G. E. Hilbert.

Jour. Amer. Chem. Soc. 71 (5): 1682-1687. May 1949.

Waxy starch was hydrolyzed by an enzyme of the amylolytic system prepared from *Aspergillus oryzae*. The enzyme contained maltase and was derived from the same base as Taka-diastase. 6-α-D-Glycopyranosido-D-glucose was isolated from the hydrolyzates by (1) removal of fermentable sugars with yeast and fractionation of the residue with alcohol and (2) separation of the principal components, D-glucose and isomaltose, on carbon-Celite columns. The isomaltose was identified by its crystalline derivative, octaacetyl-6-α-D-glucopyranoside-β-D-glucose. Isomaltose from (2) has been crystallized and is being studied further.

*ORIENTAL USES OF SOYBEANS AS FOOD WITH ATTENTION TO FERMENTED PRODUCTS. V. KOREA

By Raymond E. Culbertson and Allan K. Smith.

The Soybean Digest 9 (8): 15-18, 20, 22. June 1949.

This is Part V of a report on the junior author's trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. It was written with the collaboration of Raymond E. Culbertson, an adviser to the Korean Government on agriculture. The Korean agricultural practices and customs are described along with information on Korean climate, soil, topography, and fertilizer practices. Soybeans are discussed with respect to food and feed uses and to varieties and cultural practices.

ANALYTICAL PROCEDURES FOR CONTROL OF SACCHARIFICATION OPERATIONS

By J. W. Dunning and D. Dallas.
Annalyt. Chem. 21 (6): 727-729. June 1949.
Plant control methods for the rapid analysis of pentosans and cellulose in agricultural residues and of pentoses, furfural, and dextrose in saccharification liquors are presented. Equations for calculating yields of products are outlined.

PHENOLIC MOLDINGS--EXTRACTIVES IN THE WATER ABSORPTION TEST

By R. V. Williamson.
British Plastics 21 (241): 328-330. June 1949.
An investigation of A.S.T.M. method D570-42 for the determination of water absorption of phenol-formaldehyde plastics has shown that the method produces erroneous results. The source of error is that portion of the method designed to correct for extractives removed from the specimen during the period of its immersion in water. Extractives, as determined by the A.S.T.M. method, vary with the moisture content of the powder at the time of molding and may constitute 70 percent of the specification limit for water absorption. A direct gravimetric determination of extractives shows, for practical purposes, that they are so small they may be neglected from the water absorption test without altering the results shown by the gain in weight from immersion.

EFFECT OF VARIOUS FACTORS ON THE PRODUCTION OF POLYMYXIN

By Robert G. Benedict and Frank H. Stodola.
Ann. N. Y. Acad. Sci. 51, Art. 5: 866-874. June 1949.
Thirty-five strains of *Bacillus polymyxa* were studied in a survey to find the optimum conditions required for maximum production of the antibiotic, polymyxin. One strain out of four treated by ultraviolet irradiation produced mutants which gave yields five times as high as the unirradiated parent. The feeding of sterile dextrose during the fermentation to all test strains greatly increased polymyxin yields. Soya or peanut meals were superior to yeast extract as protein sources in the medium and would be cheaper and more available substitutes for large-scale production of this antibiotic.

REPUBLICATIONS

PAINTS FROM SOYBEAN OIL

By A. J. Lewis.
The Soybean Digest 9 (3): 16-17. January 1949. [Previously published as AIC-199. 3 pp. (Processed) July 1948.]

COMPOSITION AND ITS EFFECTS ON THE PRICE OF SOYBEANS AND SOYBEAN OIL

By R. T. Milner.
The Soybean Digest 9 (4): 20-22, 24. February 1949. [Previously published as AIC-201. 6 pp. (Processed) July 1948.]

ALCOHOLIC EXTRACTION OF OIL FROM SOYBEANS

By Arthur C. Beckel.
The Soybean Digest 9 (7): 20-21. May 1949. [Previously published as AIC-196. 5 pp. (Processed) July 1948.]

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

STILL AND DECANTER FOR THE RECOVERY OF PRODUCTS FROM ALCOHOLIC SOLUTIONS OF OLEAGINOUS MATERIALS

Arthur C. Beckel and Paul A. Belter.

U. S. Patent 2,460,117. Jan. 25, 1949.

The apparatus is designed for continuously concentrating a liquid extract to remove volatile solvent, and is particularly adapted for removing alcoholic solvent from an extract mixture of alcohol and alcohol-solubles from soybeans. It comprises first and second circulatory systems each characterized by an elongated evaporator tube, a vapor disengaging chamber, and a liquids separator. Liquid extract is fed into the first stage through the evaporator and then into the vapor disengager. The vapor is condensed and recovered, and the liquid alcoholic solvent and oil are led to the liquids separator where phase separation occurs. The separator is connected with the second stage for the purpose of withdrawing the alcoholic solvent phase and treating it in a manner similar to that effected in the first stage. Lecithin, sugar, and oil are recovered as the subnatant layer in the second-stage liquids separator, alcoholic solvent withdrawn, and alcohol vapors condensed for reuse.

PROCESS TO PRODUCE A STABILIZED PROTEIN-FORMALDEHYDE DISPERSION

Leonard L. McKinney.

U. S. Patent 2,461,070. Feb. 8, 1949.

An alkylene oxide is reacted with a protein to obtain a protein product capable of forming a stable dispersion with formaldehyde.

AERATOR

Elbert C. Lathrop and Samuel I. Aronovsky.

U. S. Patent 2,461,746. February 15, 1949.

An apparatus is described for aerating a fluid material in such a way that downwardly flowing streams of the material enfold air and are then subjected to agitation to distribute the air in minute bubbles throughout the material. The apparatus consists of a vessel containing a circular partition, the lower section of which is imperforate. The upper section comprises a plurality of vertical strips which define a plurality of weirs. At the bottom of the partition is situated an impeller for agitating an impelling fluid material downward at the bottom of the partition whence it flows upward about the outside walls of the vessel, through the weirs, and down again. The apparatus was designed particularly for the purpose of aerating a cork substitute material.

METHOD FOR THE PRODUCTION OF ITACONIC ACID

Lewis B. Lockwood and Andrew J. Moyer.

U. S. Patent 2,462,981. March 1, 1949.

A carbohydrate-containing nutrient medium is fermented with molds of the genus *Aspergillus*. A non-toxic mineral acid or ammonium salts of non-toxic mineral acids are added to bring the range of hydrogen ion concentration to pH 1.4 to pH 2.8. Before adding the acid or salt the mold spores are preferably allowed to germinate and accomplish slight mycelial growth. The process produces good yields of itaconic acid in short fermentation time, and is readily adaptable to submerged aerated culture techniques.

METHOD OF PREPARING PENTONIC ACIDS FROM PENTOSES

Lewis B. Lockwood.
U. S. Patent 2,463,784. March 8, 1949.

A nutrient medium containing an aldo-pentose is inoculated with bacteria of the genus *Pseudomonas*. The mash may be aerated by known methods, and pure synthetic nutrients may be used. The fermentation produces pentonic acids in good yield. Thus d-arabinose is converted into d-arabonic acid, and ribose or xylose converted into corresponding pentonic acids. The process possesses technical advantages over the known use of acetic acid bacteria for this purpose.

5,5'-DIHYDROXYDIAMYL ETHER

Kliem Alexander and Lester E. Schniepp.
U. S. Patent 2,467,798. April 19, 1949.

Diesters of oxydivaleric acid are reduced with the aid of sodium and alcohol to produce 5,5'-dihydroxydiamyl ether having the formula:

$$HO-(CH_2)_5-O-(CH_2)_5-OH$$

This compound is useful as a plasticizer, as a chemical intermediate, and as a high-boiling solvent.

PROCESS FOR THE RECOVERY OF OIL AND BYPRODUCTS FROM ALCOHOLIC SOLUTIONS OF OLEAGINOUS MATERIALS

Arthur C. Beckel and Paul A. Belter.
U. S. Patent 2,469,147. May 3, 1949.

In a process for extracting soybean oil and lecithin from soybean material by hot alcoholic solvents, the alcoholic extract is cooled to separate part of the soybean oil, leaving an extract containing residual soybean oil. The invention comprises an improvement for recovering the alcohol and removing the residual soybean oil and lecithin from the extract. The extract is treated in a multi-stage continuous process of continuously vaporizing the alcohol to concentrate the extract. This effects the continuous separation of vegetable oil, and the separated vegetable oil is removed from the concentrated extract. Part of the extract is then recycled to the vaporizing step and part treated by further evaporation and concentration to separate the lecithin. The first evaporating stage is so controlled as to prevent concentration to the point of lecithin separation.

PROCESS FOR THE PREPARATION OF D-GLUCOSACCHARIC ACID

Charles L. Mehltretter, Carl E. Rist, and Benjamin H. Alexander.
U. S. Patent 2,472,168. June 7, 1949.

D-Glucosaccharic acid is manufactured by the catalytic oxidation of dextrose or dextrose hydrate. The oxidation is carried out in the presence of a platinum catalyst, and it is advantageous to conduct the reaction under conditions of vigorous agitation. The reaction is carried out at pH 5.0 to pH 9.6 by adjusting the pH when necessary by adding a basic compound, such as an alkali metal hydroxide, carbonate, oxide, etc. If potassium bicarbonate is used, the desired acid may be conveniently recovered as its potassium salt.

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LIST OF PUBLICATIONS AND PATENTS

of the
Northern Regional Research Laboratory,
Peoria, Illinois

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

THE PLACE OF STRAW PULP IN FINE PAPER MANUFACTURE

By S. I. Aronovsky.
Chemurg. Digest VIII (7): 4-6, 16. July 1949.

The present situation of straw pulp in paper manufacture is discussed briefly. It is pointed out, on the basis of research at the Northern Regional Research Laboratory and of the practical experience in Europe and in South America, that the most suitable use for bleached straw pulp is as a blend with other paper-making pulps for fine specialty papers and paper products. It is concluded that such use of straw pulp will result in improved papers and products and place straw on a fairly permanent basis as a raw material for the fine paper industry.

EVALUATION OF FIBROUS AGRICULTURAL RESIDUES FOR STRUCTURAL BUILDING BOARD PRODUCTS. III. A PROCESS FOR THE MANUFACTURE OF HIGH-GRADE PRODUCTS FROM WHEAT STRAW

By E. C. Lathrop and T. R. Naffziger.
Tappi 32(7): 319-330. July 1949.

The details of a process for the manufacture of high quality, very rugged insulating board from wheat straw are presented. Two kinds of pulp are required (1) unhydrated long fibered pulp, and (2) hydrated pulp equivalent to that used in strawboard manufacture. Two methods are described for the preparation of these, either by pressure cooking or by a new, very rapid method of atmospheric cooking and disk refining. The effect of operating variables on physical properties, such as straw varieties, cooking and refining, percentages of hydrated and long fiber in pulp blends and of moisture of board into drier, have been carefully studied. Based on previous fundamental work, it is possible to arrange this information in the form of an accurate operating range of pulp blends as related to properties of finished product. Due to the springy straw fibers, the board may be dried at 50 to 55 percent moisture content with large savings in drying costs. Dense boards may be made by drying in a hydraulic press. Process equipment and economics are discussed.

POLYMERIZATION OF DRYING OILS. RUBBERLIKE PRODUCTS FROM POLYMERIC FAT ACIDS

By J. C. Cowan, D. H. Wheeler, H. M. Teeter, R. E. Paschke, C. R. Scholfield, A. W. Schwab, J. E. Jackson, W. C. Bull, F. R. Earle, R. J. Foster, W. C. Bond, R. E. Beal, P. S. Skell, I. A. Wolff, and C. Mehltretter

Indus. and Engin. Chem. 41(8): 1647-1653. August 1949.

This report of further studies on polycondensation products of polymeric fat acids includes information on the vulcanizates of α-polyesters of soybean polymeric fat esters with glycols other than ethylene glycol, and vulcanizates of polyesteramides and polyamides prepared with the same polymeric fat esters. The preparation of *p*-phenylene diisocyanate and its use as an end-group linking and cross-linking reagent, the preparation and characteristics of soybean dimeric fat esters, the preparation and vulcanization of superpolyesters to give rubberlike products of good tensile properties, and the viscolizing of petroleum oils with these superpolyesters are described.

BREEDING FOR NIACIN CONTENT IN A SORGHUM CROSS, WESTLAND × CODY

By Fred W. Tanner, Jr., A. F. Swanson, and J. J. Curtis.

Cereal Chem. 26(4): 333-338. July 1949.

A study has been made of the niacin content of grain from F_1, F_2, and F_3 plants of a Westland × Cody grain sorghum cross. Niacin content appears to be an inherent varietal characteristic. The development of varieties with high niacin content appears to be possible.

ALCOHOL-WATER INJECTION FOR SPARK-IGNITION ENGINES

By Richard Wiebe and J. C. Porter.

U. S. Dept. Agr. Bul. AIC-240. 32 pp. (Processed.) July 1949.

This is a discussion of the principle of alcohol-water injection by which alcohol is used as a supplement to increase the anti-knock properties of low-octane gasoline. Preliminary performance tests of engines, in the laboratory and on the road, are discussed and interpreted.

THE NORTHERN REGIONAL RESEARCH LABORATORY. ITS PURPOSE, ORGANIZATION, AND ACHIEVEMENTS.

U. S. Dept. Agr. Bul. AIC-243. 8 pp. (Processed.) July 1949.

THE FLAVOR PROBLEM OF SOYBEAN OIL. V. SOME CONSIDERATIONS IN THE USE OF METAL SCAVENGERS IN COMMERCIAL OPERATIONS

By H. J. Dutton, A. W. Schwab, H. A. Moser, and J. C. Cowan.

Jour. Amer. Oil Chem. Soc. 26(8): 441-444. August 1949.

Citric acid and sorbitol, tested on a commercial scale, have been found to improve not only the initial quality of soybean oil, but also its oxidative and flavor stability during storage. Certain practical considerations in the use of those metal scavengers, such as concentration, effect of temperature on activity, the point during deodorization at which the scavenger should be added for best results, the value of the water-washing step, and the role of phosphatides are reported and discussed.

AGRICULTURAL RESIDUES IN PLASTICS. III. EVALUATION OF RESIDUE FLOURS AS FILLERS IN THERMOSETTING PHENOLICS

By T. F. Clark

Mod. Plastics 26(12): 111-116, 164-165. August 1949.

Flours from 22 agricultural residues, including nut shells and fruit pits, were investigated as fillers in thermosetting phenolic molding compounds. Compounds prepared with commercial wood flour and commercial compounds were included for comparison. The resin was commercial powdered two-stage phenolic. Virtually all the residue flours could be compounded to products having characteristics meeting A.S.T.M. requirements for general-purpose phenolic molding compounds. In most cases, ease of molding and results of tests were superior to the commercial compounds.

SACCHARIFICATION LIGNIN CONCENTRATES IN PHENOLICS

By T. F. Clark.

Mod. Plastics 27(1): 119, 168-169. September 1949.

A lignin concentrate recovered following continuous acid saccharification of red corncobs was investigated as a component in the preparation of phenolic resins and as a filler in thermosetting molding compounds. Except for the improved resistance to water absorption imparted by the concentrate, the products showed no superiority in physical properties to plastics prepared from other lignins.

TRUCK OPERATION WITH ALCOHOL-WATER INJECTION

By James C. Porter

Southern Motor Cargo V (9): 10-11, 36. September 1949.

This is a discussion of performance data obtained from road tests, with alcohol-water injection, of a Northern Regional Research Laboratory 2 1/2-ton test truck, operated in Peoria and vicinity and on two runs from Peoria to Memphis, Tenn., and return. The alcohol was used as an octane improver for gasoline of an octane rating too low to permit full-throttle knock-free operation when used alone. The results, which indicate feasibility of alcohol-water injection, are shown in both graph form and tables.

CALCIUM OXIDE-SOYBEAN OIL PAINTS HAVING REDUCED TACK AND INCREASED DURABILITY

By A. J. Lewis, J. C. Cowan, and N. C. Schieltz.

Jour. Amer. Oil Chem. Soc. 26 (9): 488-492. September 1949.

It has been shown that the addition of 4 percent of calcium oxide to soybean oil paints pigmented with (a) basic lead carbonate, (b) leaded zinc (35 percent), (c) titanium-barium sulfate, or (d) zinc sulfide-asbestine improves drying characteristics of the paints. Drying time, yellowing, dirt collection, and gloss are decreased. Durability, reflectance, and permanency of initial gloss are increased.

*SAPONIFICATION OF ADDUCTS OF MALEIC ANHYDRIDE AND METHYL LINOLEATE

By Howard M. Teeter and John C. Cowan.

A Letter to the Editor, Jour. Oil and Colour Chem. Assoc. 32,473. September 1949.

A letter to the editor concerning a previous publication by the authors on maleic anhydride and linoleate ester reactions.

LIQUID-VAPOR EQUILIBRIUM OF ETHANOL-METHYLCYCLOHEXANE SOLUTIONS

By Carl B. Kretschmer and Richard Wiebe.

Jour. Amer. Chem. Soc. 71 (9): 3176-3179. September 1949.

Following publication by the Northern Regional Research Laboratory describing results on the liquid-vapor equilibria of ethanol-toluene solutions, investigations were extended to solutions of ethanol in methylcyclohexane. For this system, densities and refractive indices at 25° C. and total and partial vapor pressures at 35° and 55° were measured. The thermodynamic consistency of the results was found to be satisfactory. The vapor compositions can be represented with good accuracy by the empirical equation previously developed by the authors. The excess free energy and entropy and enthalpy have been calculated from the data, and exhibit a similar behavior to that of other alcohol-hydrocarbon systems.

RESEARCH ON FLAVOR STABILITY OF SOYBEAN OIL AT THE NORTHERN REGIONAL RESEARCH LABORATORY

By J. C. Cowan.

The Soybean Digest 9 (11): 48-50, 89. September 1949.

The research work on the flavor stability of soybean oil at the Northern Regional Research Laboratory is reviewed.

HYDROLYSIS OF THE ALPHA-1,6 GLUCOSIDIC LINKAGE IN ISOMALTOSE BY CULTURE FILTRATE OF ASPERGILLUS NIGER NRRL 330.

By H. M. Tsuchiya, E. M. Montgomery, and Julian Corman.

Jour. Amer. Chem. Soc. 71 (9): 3265. September 1949.

The anomalous α-1,6 glucosidic linkage in the amylopectin fraction of starch is resistant to hydrolysis by the action of the more common amylolytic enzymes. It has been found, however, that the culture filtrate of *Aspergillus niger* NRRL 330 is capable of hydrolyzing this type of alpha glucosidic linkage in the disaccharide isolated from amylopectin. The extent of hydrolysis was estimated by the increase in copper reducing power of reaction mixtures. The glucose produced as a result of isomaltose hydrolysis was identified by biological techniques and also as the crystalline sugar.

AGRICULTURAL RESIDUE FLOURS. AS EXTENDERS IN PHENOLIC RESIN GLUES FOR PLYWOOD

By R. V. Williamson and E. C. Lathrop.

Mod. Plastics 27 (2): 111-12, 169-70, 72, 74. October 1949.

Flours from wheat straw, corncob, flax shive, cottonseed hull, rice hull, English walnut, pecan, hard almond, soft almond, peanut and apricot pit shell, and corncob lignin concentrate have been investigated as extenders for phenolformaldehyde glues for plywood. The results show that a saving in resin of 21 to 48 percent is possible by the use of the various residues. The composition and physical properties are given for each of the agricultural residue-extended glues that produced maximum economy of resin without reducing the strength properties of the glue.

COLOR EVALUATION OF EDIBLE FATTY OILS

By Duncan Macmillan.

Jour. Amer. Oil Chem. Soc. 26 (10): 615-617. October 1949.

The physical and psychological bases for color are described briefly. From them, principles characterizing the reaction of the "Standard Observer" are defined. Methods of color designation are explained, particularly the International Commission on Illumination system. A short survey of color-matching systems is presented. The problems of color matching and color evaluation used in the vegetable-oil trade are discussed at some length.

REACTION OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. II. METHYL OLEATE

By Howard M. Teeter and John E. Jackson.
Jour. Amer. Oil Chem. Soc. 26 (10): 535-540. October 1949.

From an investigation of the conditions for reaction and the nature of the products obtained in the reaction of methyl oleate and tert. butyl hypochlorite, it is concluded that the reaction product contains an allylic chloride, a non-allylic chloride, and a saturated dichloride.

THE CHEMICAL COMPOSITION OF VARIOUS WHEATS AND FACTORS INFLUENCING THEIR COMPOSITION

By J. H. Shollenberger, J. J. Curtis, C. M. Jaeger, F. R. Earle, and B. B. Bayles.
U. S. Dept. Agr. Tech. Bul. 995, 33 pp. (Processed.) October 1949.

Analyses were made of the ash, protein, oil, sugar, and starch content of 481 samples of wheat grown during the period 1940-44 at 63 locations in the United States and Canada. The leading varieties of each commercial class were obtained from the locations where they were adapted. Differences in ash, protein, sugar, and starch contents of the same varieties grown at different locations and in different seasons were much larger than those of different varieties grown under comparable conditions. Oil content, on the other hand, was mainly a varietal characteristic.

A NEW SOYBEAN PRODUCT - GELSOY

By A. C. Beckel, P. A. Belter, and A. K. Smith.
The Soybean Digest 10 (1): 17-18, 40. November 1949.

A new soybean proteinaceous product developed at the Northern Regional Research Laboratory has been given the name *Gelsoy*. The bland taste of Gelsoy and its whipping and gelling properties indicate it may possibly find wide application in the food industry. Its adhesive characteristics promise several special industrial applications. Gelsoy is a water-soluble product. It is derived either from soybeans which have been solvent-extracted with ethanol or from special soybean flakes which have been washed with ethanol; the latter is the more practical procedure at present.

POLYMERIZATION OF DRYING OILS. V. FURTHER OBSERVATIONS ON THE REACTION OF UNSATURATED DIBASIC ANHYDRIDES WITH METHYL LINOLEATE

By H. M. Teeter, U. S. Kini, R. A. Myren, and J. C. Cowan.
Jour. Amer. Oil Chem. Soc. 26 (11): 660-663. November 1949.

It has been found that, in the condensation of methyl linoleate with itaconic and citraconic anhydrides, each reaction product can be separated by molecular distillation into volatile and non-volatile components. On heating with ethylene diamine, the latter gave gels after 1 to 3.5 hours at 170° C. Methyl linoleate was condensed with an equimolecular amount of maleic anhydride in the presence of dimethylaniline to give a solid heteropolymer and a liquid adduct.

FACTORS AFFECTING RIBOFLAVIN PRODUCTION BY ASHYBA GOSSYPII

By F. W. Tanner, Jr., C. Vojnovich, and J. M. Van Lanen.
Jour. Bact. 58 (6): 737-745. December 1949.

The organism *Ashbya gossypii* was found capable of biosynthesizing large amounts of riboflavin when propagated in certain media under conditions of submerged aerobic cultivation. It was found that glucose, corn steep liquor, and animal stick liquor compose a satisfactory medium. The use of small quantities of young inocula, a minimum sterilization time, and an efficient means of aeration were additional factors of importance. The data indicate that under ideal conditions the commercial production of riboflavin either in concentrated or pure form might be based upon the use of *A. gossypii.*

REPUBLICATIONS

EVALUATION OF FIBROUS AGRICULTURAL RESIDUES FOR STRUCTURAL BUILDING BOARD PRODUCTS. II. FUNDAMENTAL STUDIES ON WHEAT STRAW FIBER

By E. C. Lathrop and T. R. Naffziger.
Fibre Containers 34 (5): 60-67. May 1949. [Previously published in Tappi 32 (2): 91-96. February 1949.]

ORIENTAL METHODS OF USING SOYBEANS AS FOOD WITH SPECIAL ATTENTION TO FERMENTED PRODUCTS

By Allan K. Smith.
U. S. Dept. Agr. Bul. AIC-234. 40 pp. 24 illus. (Processed.) June 1949.
This is a report on a trip to China, Japan, and Korea to study methods of Oriental peoples in using soybeans as food. The author gives his observations on customs and food habits of the people, especially concerning their vegetarian diet. China, Japan, and Korea are dealt with separately. Included is information on farming conditions, customs, and oilseed production. [Originally published serially in The Soybean Digest, February through June 1949.]

*SOYA BEAN OIL FOR THE PAINT INDUSTRY; AN IMPORTANT NEW DEVELOPMENT

By A. J. Lewis.
Paint Indus. Mag. 64 (7): 198, 200. July 1949.
[Previously published as AIC-199, and also in The Soybean Digest 9 (3): 16-17, January 1949, as "Paints from Soybean Oil."]

**ADD TO SUPPLEMENT 3

DRYING AND ITS EFFECTS ON THE MILLING CHARACTERISTICS OF SORGHUM GRAIN

Section 2, Wet Milling
By R. A. Anderson and R. L. Zipf.
Texas Agricultural Experiment Station Bulletin 710. pp. 36-44. June 1949.
Samples of grain sorghum of two varieties that had been harvested at three moisture levels and dried with air at temperatures of 125°, 150°, 175°, and 200° F. were wet milled to determine the effect of artificial drying on the milling characteristics of the grain. Data on an extensive series of experiments are presented. It is concluded that no damage, detrimental to wet-milling operations, occurs when grain sorghum is artificially dried, provided the grain is not dried to less than 12 to 13 percent moisture content.

*****Notice of publication received after preparation of Supplement.***

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

STARCH RECOVERY PROCESS

Richard L. Slotter and Justin M. Tuomy.
U. S. Patent 2,475,261. July 5, 1949.

Wheat starch slurries which are normally difficult to filter are treated by an ageing step. The slurry is derived by treating wheat flour with water and separating the aqueous starch milk from the gluten, the resulting slurry containing appreciable amounts of soluble protein. For ageing, the slurry is allowed to stand for 10 to 50 hours, during which the pH falls below 7.0. The supernatant liquid is then decanted and the settled starch is washed. The starch may then be filtered easily.

METHOD FOR PRODUCTION OF PENICILLIN

Andrew J. Moyer.
U. S. Patent 2,476,107. July 12, 1949.

Penicillin is produced by use of an aqueous nutrient medium containing 5 to 100 grams of a source of assimilable carbon and 5 to 100 grams of a degraded proteinaceous material per liter of medium. Penicillin producing molds, such as *Penicillium notatum* Westling, *P. chrysogenum* Thom, *P. baculatum* Westling, and *P. cyaneo-fulvum* Biourge are used. The carbon source may be an assimilable organic acid, polyhydric alcohol, or carbohydrate. The proteinaceous material may be proteoses, peptones, polypeptides, peptides, and amino acids. Preferred specific nutrients are lactose and corn-steeping liquor.

PROTECTIVE COATING COMPOSITIONS AND METHODS FOR PRODUCING THE SAME

John C. Cowan and Howard M. Teeter.
U. S. Patent 2,477,116. July 26, 1949.

Polymeric fat acids, polymers of the order of 2 or 3 fat acid residues, are caused to react chemically with divalent metal bases to form salts. The salts, particularly the zinc salt, are of a resinous nature and are valuable in coating compositions.

METHOD OF PRODUCING PROLAMINE FILAMENTS

Clarence B. Croston and Cyril D. Evans.
U. S. Patent 2,478,248. Aug. 9, 1949.

A process is claimed for the production of a prolamine filament. An aqueous alkaline dispersion of a prolamine, such as zein, is reacted with an aldehyde equal to 1/2 to 10 percent of the weight of the prolamine. The treated dispersion is then spun into an acid bath to coagulate the prolamine, and the spun filament is then cured in a bath containing an acid and an aldehyde. The curing bath has a pH between 1 and 3, and the curing temperature ranges from 30° to 55° C. The cured filament is washed, stretched, and dried, after which it is heated to between 140° and 180° C. The final baking treatment increases water resistance and prevents blushing.

FERMENTATION PROCESS

Henry M. Tsuchiya, James M. Van Lanen and Asger F. Langlykke.

U. S. Patent 2,481,263. Sept. 6, 1949.

A mixture of acetone, butanol, and ethanol are produced by the fermentation of a crude xylose-containing liquor such as may be obtained by the acid hydrolysis of corncobs. Organisms used are from the known class of butyl-acetonic bacteria, for example, *Clostridium* A-14 (NRRL-B-594). Toxic materials are removed from the crude liquor by the addition of finely divided iron. Furthermore, the crude liquors may be benefited by neutralization while hot; also, the neutralized liquor may be "flash" sterilized prior to inoculation. These treatments serve to remove materials deleterious to the fermentation process, and do so without materially altering beneficial factors inherently present in the liquors. As a result, the liquors can be fermented successfully without the addition of farinaceous materials, and the requirement for expensive nutrients is minimized.

DIENE ADDITION PRODUCT AND PROCESS FOR MAKING IT

Howard M. Teeter, Charles R. Scholfield and John C. Cowan.

U. S. Patent 2,483,791. Oct. 4, 1949.

Alkyl esters of conjugated polyunsaturated fat acids, such as alkyl esters of conjugated linoleic acid, are condensed with derivatives of crotonic acid to form a product useful in the preparation of plasticizers, softening agents, and are valuable intermediates in the preparation of high polymeric materials. A molecular excess of crotonic acid esters or crotononitrile is heated with the fat acid ester at 175-275° C. Conjugated dienic high molecular weight alcohols having the carbon skeleton of a semi-drying oil fatty acid may be used in place of the polyunsaturated ester.

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Peoria, Illinois

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PUBLICATIONS

[Publications marked (*) are not available for distribution]

CHEMICAL COMPOSITION OF GRAIN AND SEED HULLS, NUT SHELLS, AND FRUIT PITS

By G. H. Nelson, L. E. Talley, and S. I. Aronovsky.
Transactions (American Association of Cereal Chemists) 8 (1): 58-68. January 1950.
Comparative analyses of agricultural residues for determining their suitability for industrial purposes were made on 23 samples of seed hulls, fruit pits, and nut shells by standard procedures. Analyses for cutin and monoethanolamine cellulose were included and are described in detail. The residues were shown to contain larger amounts of lignin and smaller amounts of alpha-cellulose than are usually found in fibrous agricultural materials. The pentosan content of these materials was found to vary considerably but was in the same general range as found in other residues such as stalks and cobs.

FRACTIONATION AND STRUCTURE OF SOYBEAN GLYCERIDES

By H. J. Dutton, C. R. Lancaster, and O. L. Brekke.
Journal of American Oil Chemists' Society 27 (1): 25-30. January 1950.
The distribution of fat acids within the glycerides of soybean oil, calculated for both random and even patterns, has been compared with data obtained in experimental fractionations. Results are discussed in relation to the utilization of soybean oil for paint and edible purposes.

HOP VINES FOR PAPER

By H. M. Sutcliffe, A J. Ernst, and S I. Aronovsky.
The Hopper (The Hop Grower's Magazine) 6 (10): 4-7. January 1950.
Preliminary pulping tests on hop vines indicate that this material, like some of the other woody agricultural residues such as soybean stalks and flax shives, could probably be used as filler material in corrugating paper or board products during periods of shortage of more suitable raw materials. The hop vine pulp appears to be unsuitable, practically and economically, for fine specialty paper pulps.

FURTHER INVESTIGATIONS ON THE PRESERVATION OF MOLD CULTURES

By Dorothy I. Fennell, K. B. Raper, and May H. Flickinger.

Mycologia 42 (1): 135-147. January-February 1950.

Viability tests reported in 1945 on lyophilized cultures stored for approximately 2 and 3 1/2 years were repeated at 5 and 7 years, respectively. No substantial reductions in measurable viability were found. These tests covered a wide variety of molds that included members of the Mucorales, the Aspergillaceae, the Dematiaceae and other imperfect forms, and a few ascomycetous species. To compare different methods of preservation, 250 members of the Mucorales, representing more than 60 species in 14 genera, were kept for 2 to 2 1/2 years (a) in lyophilized form, (b) in soil, (c) under mineral oil, and (d) as malt agar slants. All strains grew from the lyophil preparations, whereas 15 soil cultures, 49 oil-sealed cultures, and 74 agar slant cultures were found to be nonviable. A general correlation between species identity and viability was observed.

ALCOHOL-WATER INJECTION FOR HIGH COMPRESSION TRACTOR AND AUTOMOBILE ENGINES

By James C. Porter, Max M. Gilbert, Howard A. Lykins, and Richard Wiebe.

Agr. Engin. 31 (2): 71-75. February 1950.

This is a discussion of fundamental data obtained by use of alcohol-water injection in high-compression tractor and automobile engines to increase the anti-knock properties of current (1949) "premium-grade" gasolines to satisfy the octane requirements of future high-compression engines. A comparison is made of various alcohols and alcohol-water mixtures with and without the addition of tetraethyl lead when injected manually in combination with various base gasolines typical of current premium-grade gasoline. The amount of injection necessary under various engine conditions was determined. Performance tests, both on a chassis dynamometer and on the road, are discussed and interpreted. The fundamental data presented, which must be considered as preliminary, may serve as a guide for future practical tests.

INDUSTRIAL ALCOHOL

By P. Burke Jacobs.

U. S. Dept. Agr. Misc. Pub. No. 695, 101 pp. February 1950.

Technological information is presented on methods of processing, plant and equipment requirements, raw materials, byproduct recovery, and possible future developments in manufacturing techniques. This is supplemented with flow sheets and illustrations of the alcohol plant of the Northern Regional Research Laboratory, Peoria, Ill. Present organization of the alcohol production industries and legal aspects of alcohol production are explained. In addition, production and use statistics are presented, with discussion of trends in production and markets and competition from other alcohols. Future use of alcohol for synthetic rubber or motor fuel is discussed in relation to possible programs of surplus agricultural crop utilization. The alternative production of synthetic liquid fuels from gas, coal, shale oil, etc., also is shown in perspective. An extensive bibliography is included.

PREPARATION AND REACTIONS OF DIALKOXYTETRAHYDROFURANS

By Jørgen Fakstorp, Dolores Raleigh, and L. E. Schniepp.

Jour. Amer. Chem. Soc. 72 (2): 869-874. February 1950.

This is a description of an improved procedure for the alkoxylation of furans. The resulting 2,5-dialkoxy-dihydrofurans were catalytically hydrogenated over Raney nickel to the corresponding dialkoxytetrahydrofurans which were hydrolyzed to 1,4-dicarbonyl compounds. It was thus possible to prepare succinaldehyde from furan. Methylfuran, furfuryl alcohol, and the diacetal of furfural were converted to α-substituted dialkoxytetrahydrofurans. Copper chromite, platinum oxide, and palladium were shown to catalyze hydrogenolysis reactions.

PATENT APPLICATIONS FOR INTERFERENCE ONLY.

By W. L. Cheesman.

Patent Off. Soc. Jour. 32 (2): 147-154. February 1950.

A new procedure is suggested for filing a special type of patent application for purposes of interference only. Such "interference only" applications would reduce to a minimum the great amount of time and effort presently required for conventional patent applications, yet would challenge priority in all interfering patent applications which normally would be encountered during the prosecution of a conventional case. In practice, the proposed application would be filed, action by the Patent Office would be suspended, and an abstract subsequently published; and unless an interference developed, the case would be abandoned after about 3 years pendency.

CONDUCTING A TASTE PANEL FOR THE EVALUATION OF EDIBLE OILS

By H. A. Moser, H. J. Dutton, C. D. Evans, and J. C. Cowan.

Food Tech. 4 (3): 105-109. March 1950.

The development of taste panel methods used at the Northern Regional Research Laboratory to evaluate edible oils is described. The importance of a well-organized procedure, the maintenance of interest, and the evaluation of panel and individual performance by statistical means is discussed.

PRODUCTION OF RIBOFLAVIN (VITAMIN B_2) WITH ASHBYA GOSSYPII

By Thomas G. Pridham, Harlow H. Hall, and Virgil F. Pfeifer.

U. S. Dept. Agr. Bul. AIC-271. 12 pp. (Processed.) March 1950.

This bulletin has been prepared for persons interested in *Ashbya gossypii* to familiarize themselves with this yeast-like fungus capable of synthesizing large amounts of riboflavin (vitamin B_2). The occurrence and importance, and the morphological, cultural, and physiological characteristics of the microorganism are briefly summarized. Methods are presented in detail for the production of riboflavin in 500-milliliter flasks, and in 50-liter, 300-gallon, and 800-gallon fermentors.

REACTIONS OF TERTIARY BUTYL HYPOCHLORITE WITH VEGETABLE OILS AND THEIR DERIVATIVES. III. CHLORINATION OF SOYBEAN OIL IN THE PILOT PLANT

By E. W. Bell and H. M. Teeter.

Jour. Amer. Oil Chem. Soc. 27 (3): 102-105. March 1950.

The chlorination of soybean oil with *tert*-butyl hypochlorite and subsequent dehydrochlorination to form a fast-drying oil, previously successful in the laboratory, has now been accomplished successfully on a pilot-plant scale. The procedure is described.

STABILIZATION OF ZEIN FILAMENTS. CURING WITH FORMALDEHYDE IN ACIDIC NONAQUEOUS MEDIUMS

By C. Bradford Croston.

Indus. and Engin. Chem. 42 (3): 482-484. March 1950.

It has been shown that essentially anhydrous curing mixtures consisting of an inert solvent, aldehyde, and strong acid have remarkable stabilizing effect on zein fibers. The cure was very rapid at 100° C. and produced irreversible formaldehyde crosslinks. The stabilization was most evident in the reduction of shrinkage which was reflected in unusual strengths of the fiber after boiling in acid dyebaths.

CONDENSATION OF SUGAR ACIDS WITH SULFANILAMIDES

By C. L. Mehltretter.

Recueil des travaux chimiques des pays-bas 69 (4): 185. April 1950.

In this note to the editor, reference is made to published work of the author regarding the condensation of sugar acids with sulfanilamide.

ADSORPTION ANALYSIS OF LIPIDS. IV. FRACTIONATION OF CHOLESTEROL AND ERGOSTEROL

By Fred K. Kawahara and Herbert J. Dutton.
Jour. Amer. Oil Chem. Soc. 27 (5): 161-164. May 1950.
Separations of cholesterol and ergosterol by chromatographic adsorption analysis were found to be sufficiently complete to warrant application of the adsorption analysis technique to soybean sterols.

THE PREPARATION OF CALCIUM D-ARABONATE FROM CALCIUM 2-KETO-D-GLUCONATE BY ELECTROLYTIC BROMINE OXIDATION

By C. L. Mehltretter, W. Dvonch, and C. E. Rist.
Jour. Amer. Chem. Soc. 72 (5): 2294-2295. May 1950.
The electrolytic bromine oxidation of calcium D-gluconate to calcium D-arabonate suggested that calcium 2-keto-D-gluconate is first formed and is then rapidly decarboxylated and oxidized to calcium D-arabonate. Evidence for this mechanism was obtained when calcium 2-keto-D-gluconate was electrolytically oxidized to calcium D-arabonate in 84-percent yield.

SOFT GRITS PROVIDE LOW COST METHOD FOR BLAST CLEANING METALS

By T. F. Clark and E. C. Lathrop.
Materials and Methods 31 (5): 67-69. May 1950.
Soft grits prepared from corncobs and shells of nuts and fruit pits were studied as blast cleaning abrasives with and without addition of rice hulls. Relative effectiveness and durability of the soft grits are tabulated. Proved applications for soft-grit blasting include maintenance of electrical equipment, reconditioning automotive and aircraft engines, cleaning food processing and chemical equipment, paint removal from automobile bodies before repainting, and similar uses. The method was found safe and economical. Its use causes no dimensional changes on metal parts.
Condensation in Amer. Mach. 94 (12): 127. June 1950.

SOME CHARACTERISTICS OF THE STARCHES OF THREE SOUTH AMERICAN SEEDS USED FOR FOOD

By M. J. Wolf, M. M. MacMasters, and C. E. Rist.
Cereal Chem. 27 (3): 219-222. May 1950.
As part of a general study of the character of natural starches, a number of native and foreign plant species were examined. In the course of this work, seeds of *Amaranthus leucosperma*, *Chenopodium Quinoa*, and *C. paludicaule* were processed for starch, and were found to contain (dry basis) 62.8, 61.5 and 51.1 percent of starch, respectively. The starch from *A. leucosperma* resembled the starches of waxy varieties of cereal grains. The three starches gelatinized within the range 48°-72° C. Starch of *A. leucosperma* formed a long paste, *C. Quinoa* starch a paste of the same length as that of cornstarch, while *C. paludicaule* starch formed a thin, watery suspension. None of the pastes gelled on standing.

CYANOETHYLATION OF ALPHA AMINO ACIDS. I. MONOCYANOETHYL DERIVATIVES

By L. L. McKinney, E. H. Uhing, E. A. Setzkorn, and J. C. Cowan.
Jour. Amer. Chem. Soc. 72 (6): 2599-2603. June 1950.
The monocyanoethyl derivatives of nine alpha amino acids were prepared in good yields by reacting acrylenitrile with the alkali or alkaline earth metal salts of the amino acids in aqueous solution. Monocyanoethyl glutamic acid readily cyclized in hot acetone to give the glutiminic acid derivative. Except for monocyanoethyl proline and monocyanoethyl glutiminic acid, all of the derivatives exhibited Zwitterionic properties similar to those of the parent amino acids.

NIACIN CONTENT OF WAXY, SUGARY, AND DENT F_2 SEGREGATING KERNELS IN CORN

By Earl R. Leng, J. J. Curtis, and M. C. Shekleton.

Science 111 (2894): 665-666. June 16, 1950.

Self-pollinated ears from F_1 plants of a cross between high-niacin sugary and low-niacin waxy strains of corn were used in an experiment designed to compare the effects of the waxy, sugary, and dent endosperm conditions on the niacin content of the corn kernel. The average niacin content of the sugary kernels was found to be 23 percent higher than that of the waxy kernels, while the waxy kernels were in turn about 18 percent higher in niacin than the dent kernels. No evidence was found of genetic linkage between factors affecting endosperm type and those affecting niacin content in the material studied. It is suggested that vitamin-carbohydrate interrelationships in the developing corn kernel may be involved.

PERIODATE OXIDATION OF DEXTRAN

By Allene Jeanes and C. A. Wilham.

Jour. Amer. Chem. Soc. 72 (6): 2655-2657. June 1950.

The well-known method of periodate oxidation was applied to six different dextran preparations obtained by the action of four different strains of *Leuconostoc mesenteroides* on sucrose. From measurement of the formic acid produced and the sodium metaperiodate reduced, it was calculated that the ratio of 1,4- to 1,6-α-glucopyranosidically linked units in these dextrans ranged from 1 to 3 to 1 to 24. In marked contrast to the behavior of amylaceous substances under the same experimental conditions, the primary oxidation product of dextran was stable to further oxidation by the reagent.

LIME AS A HARDENING AGENT IN SOYBEAN OIL PAINTS

By A. J. Lewis

The Soybean Digest 10 (8): 17-18. June 1950.

This is a discussion of how the hardening qualities of soybean oil paint coatings have been improved by the use of lime in paint pigments, and how such use has resulted in the elimination of dust, dirt, and bug retention even from experimental coatings of paints containing 100 percent soybean oil. The improvement in durability, non-yellowing characteristics, light reflectance qualities, and appearance is also discussed.

REPUBLICATIONS

ALCOHOL FROM AGRICULTURAL SOURCES AS A POTENTIAL MOTOR FUEL

By G. E. Hilbert.

AIC-233 (Rev.) February 1950 [Previously published as AIC-233, May 1949, which in part was a revision of OP5499, May 1948.]

STRAW PULP IN FINE PAPER MANUFACTURE

By S. I. Aronovsky.

Paper Indus 32 (1): 88-90. April 1950 [Previously published, unabridged, in Chemurg. Digest VIII (7): 4-6, 16. July 1949, as "The Place of Straw Pulp in Fine Paper Manufacture."]

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

COLD-SETTING RESORCINOL GLUE COMPOSITION AND PROCESS OF PREPARATION

Glen E. Babcock and Allan K. Smith.

U. S. Patent 2,494,537. January 17, 1950.

A cold-setting glue is prepared by reacting resorcinol with formaldehyde in a molal ratio 2:1-5:4 in the presence of an acid catalyst. The pH is adjusted to 7.1-7.7 and the resin admixed with an approximately equal quantity of corn gluten. Sufficient formaldehyde is added at this point to give a final ratio of resorcinol to formaldehyde of 1:1.1-2.5. The glues are cold-setting, water-resistant and mold-resistant, and are particularly useful in making plywood.

PAINT COMPOSITION FROM CATALYTICALLY CONJUGATED OILS.

Arthur J. Lewis, Helen A. Moser, and John C. Cowan.

U. S. Patent 2,494,565. January 17, 1950.

A paint mixture is prepared with catalytically conjugated soybean oil as the principal oil vehicle. Oil conjugated by treatment in the presence of a nickel-carbon catalyst is preferred. Residual tack and after-tack are eliminated by the addition of a minor amount of an alkali metal oxide to the pigment. The patent is particularly directed to lead-base paints. Tabular data show that the soybean oil paints of the invention are in many properties equal or superior to linseed oil paints.

VEGETABLE GEL.

Letta I. DeVoss, Arthur C. Beckel, and Paul A. Belter.

U. S. Patent 2,495,706. January 31, 1950.

Comminuted soybeans are treated to remove the oil by any conventional method, such as extraction or pressing. The residual oil-free material is then washed or extracted with alcohol to remove substantially all alcohol-soluble matter. After alcohol extraction, the material is subsequently extracted with water to obtain a mixture of proteinaceous material dispersed in an aqueous solution of water solubles. The fibrous, insoluble soybean material is removed, and the aqueous dispersion forms an irreversible gel upon heating. The aqueous dispersion may be dried to obtain a solid, powdery material. This material may be dispersed in water to make up a gelable liquid. The gels possess a bland taste and may be mixed with a wide variety of food and flavor materials prior or subsequent to gelling. Such gel food compositions retain their shape indefinitely at all temperatures to which food products are normally exposed.

PROCESS OF CULTURING BACTERIA.

Lewis B. Lockwood and Frank H. Stodola.

U. S. Patent 2,496,297. February 7, 1950.

Bacteria of the genus *Pseudomonas*, family Pseudomonadacose, are cultivated in a medium containing a reducing disaccharide. The disaccharide is converted directly to the corresponding bionic acid without initially splitting the disaccharide by hydrolysis. Disaccharides, such as maltose and lactose, are converted to maltobionic acid and lactobionic acid, respectively, in approximately 80 percent yield. A 10-percent solution of the disaccharide is preferred. Fermentation under submerged aerobic conditions gives highest yields.

ELECTROLYTIC PREPARATION OF CALCIUM D-ARABONATE

Charles L. Mehltretter and William Dvonch.
U. S. Patent 2,502,472. April 4, 1950.

Calcium D-arabonate is obtained by the oxidation of an aqueous solution of calcium 2-keto-D-gluconate by bromine. The bromine is generated in solution by electrolysis of a bromide salt. Considerably less than one equivalent of bromide is needed to oxidize one equivalent of the gluconate. Graphite electrodes are preferred, and the solution should be mechanically stirred during the oxidation. The process is carried out under slightly acidic conditions and at a temperature in the range of 5°-30° C. The electrolysis is discontinued when a minimum reduction with Fehling's solution is reached. Yields of calcium D-arabonate as high as 85 percent can be obtained by the process.

LIGNOCELLULOSE, PHENOL FORMALDEHYDE, AND INORGANIC FILLER MOLDING COMPOSITION

Robert V. Williamson and Thomas F. Clark.
U. S. Patent 2,502,498. April 4, 1950.

High-grade, general-purpose molding compounds of the phenol-formaldehyde type are prepared by using considerably less than the customary proportion of the expensive phenolic component. One of the principal ingredients of the compounds (at least 50 percent) is lignocellulose flour such as comminuted rice hulls, wheat straw, flax shives, corncobs or other agricultural residues or wood flour. Another principal ingredient (approximately 25 percent) is an inorganic extender such as precipitated chalk, diatomaceous earth, iron oxide or titanium dioxide. The remaining principal ingredient (approximately 25 percent) is phenol-formaldehyde resin. Molded articles made from these compounds are comparable in strength, appearance, and water resistance to conventional phenolics containing twice as much phenol-formaldehyde.

DERIVATIVES OF PARAHYDROXYPENICILLIN G

Frank H. Stodola, Jacques L. Wachtel and Robert D. Coghill.
U. S. Patent 2,504,161. April 18, 1950.

(Assigned to the Office of Scientific Research and Development) Aromatic azo derivatives of parahydroxypenicillin G are claimed.

SEPARATION OF STARCH FROM WHEAT FLOUR

Everette M. Burdick.
U. S. Patent 2,504,962. April 25, 1950.

Starch is separated from wheat flour, particularly granular wheat flour, by a method closely allied to the "batter process." A batter is formed by adding wheat flour to water, the water being 80-140 percent of the flour by weight. The batter is mixed for a sufficient time to hydrate the gluten and then diluted further with water to a ratio of water to flour of 3-5 to 1. The diluted batter is passed over a screen to separate the starch milk from a crude starchy-gluten-bran mass. The crude mass is then agitated and aerated in water to disperse the air in the mass and beat the starch and the bran from the gluten. The gluten separates and rises in the form of a thick frothy mass. The gluten separated by the flotation step, after washing, is quite pure and contains only a small percentage of starch.

VEGETABLE OIL EXTRACTION

A. C. Beckel, P. A. Belter, and H. J. Deobald.
U. S. Patent 2,505,749. May 2, 1950.

Fatty oils are extracted from vegetable seeds or nut meats by the "non-distillation" method which uses a hot alcoholic solvent. The extract is cooled to below 25° C. to effect separation into two liquid phases, an oil layer and another of the supernatant solvent. This invention is an improvement on the "non-distillation" process, and involves heating locally the interface zone to a temperature at least slightly higher than the major portion of the supernatant alcoholic phase. It eliminates the problem of semi-solid waxy material which tends to collect at the interface. The solids release entrapped liquid, fall downward through the oil layer, and collect below it. The extract may be passed continuously upward through the cooling zone, alcohol being removed from the top section of the zone and oil passing downward through a zone heated to break the emulsion.

PRODUCTION OF TANNIN AND SOFT-GRIT BLASTING MATERIAL FROM NUTSHELLS

Elbert C. Lathrop.
U. S. Patent 2,510,119. June 6, 1950.

Nut shells, such as pecan shells, are subjected to the shattering action of an impact comminution. This treatment produces relatively coarse shell fragments admixed with a light powdery product comprising the tannin-rich lining of the shell. The mixed product is separated into a light colored shell fraction and a darker colored tannin-rich fraction by pneumatic means.

METHOD FOR STRIPPING SOLVENTS FROM OILS

Arthur C. Beckel and Paul A. Belter.
U. S. Patent 2,511,833. June 20, 1950.

Volatilizable material is vaporized from a liquid by introducing the liquid into the bottom portion of a vertical tube. A stripping gas, bubbled up through the liquid, causes the liquid to spread on the interior surface of the tube as a film. The stripping gas is introduced at a rate which causes the liquid film to rise along the surface.

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PUBLICATIONS

THE EFFECT OF FEEDING CRUDE POLYMIXIN D ON THE INTESTINAL BACTERIA OF CHICKENS.

H. J. Peppler, E. B. Oberg, R. G. Benedict, and L. A. Lindenfelser.
Poultry Sci. 29(4) 520-526. July 1950.

In a search for wider uses of carbon-adsorbed polymyxin D, this antibiotic was employed as a 0.5 to 2.5 percent supplement in the normal rations of young chickens. Passage of the carbon-adsorbed antibiotic through the digestive system resulted in elution of the antibiotic with a subsequent marked decrease in the numbers of gram-negative bacteria in the gut and a substantial weight increase in those birds receiving 0.5 to 1 percent antibiotic supplement. No measurable level of polymyxin was found in the blood of treated birds. The possible role of vitamin B_{12} or associated APF factors in the weight increases were not determined in these studies.

MANUFACTURE OF CELLULOSE PULPS FROM STRAW

S. I. Aronovsky
U. S. Dept. Agr. Bul. AIC-280. 8 pp (Processed.) July 1950.
Paper Indus. 32(6) 628, 650, 652, 654, 656, 657. September 1950.

A brief history of the utilization of straw for pulp, paper and board, particularly in North America, is given. It is estimated that nearly a billion tons of straw is produced annually in the world, and about half of this amount is available for industrial use. Costs of collecting and baling straw have been lowered, and a simple method of preserving the baled straw in open storage has been worked out. The physical and chemical properties of straw and of its individual constituents are discussed briefly and the advantages of straw over some of the other fibers are pointed out. The neutral sulfite process and the new mechano-chemical process for pulping straw, developed at the Northern Regional Research Laboratory of the U. S. Department of Agriculture, are reviewed. Both methods produce high yields of strong, easy bleaching, papermaking pulps. The use of a portion of the estimated amounts of straw wasted annually would allow the pulp and paper industry of the world to meet the expected increasing requirements for paper and board products without excessive drain on the present timber and pulp-wood resources. Such a plan would result in increased over-all economy of the world's pulp and paper industries.

PRODUCTION OF MOLD AMYLASES IN SUBMERGED CULTURE. II. FACTORS AFFECTING THE PRODUCTION OF ALPHA-AMYLASE AND MALTASE BY CERTAIN ASPERGILLI.

Henry M. Tsuchiya, Julian Corman, and Harold J. Koepsell.
Cereal Chem. 27(4): 322-330. July 1950.

It has been shown by this study that the amounts of alpha-amylase and maltase produced in aerated submerged cultures of certain *Aspergilli* can be controlled by the concentrations of corn and distillers' thin stillage solids. With *Aspergillus niger* NRRL 337 and 330, raising the level of stillage solids increased the yield of alpha amylase. With these organisms, 5 percent concentrations of both corn and stillage solids gave maximal maltase yields. With *Aspergillus oryzae* NRRL 458, the concentrations of the two medium constituents had little, if any, effect on the production of either alpha amylase or maltase. The incorporation of calcium carbonate in the enzyme production medium affected deleteriously the yield of maltase.

A NEW STREPTOMYCIN.

R. G. Benedict, F. H. Stodola, O. L. Shotwell, A. M. Borud, and L. A. Lindenfelser
Science 112(2899): 77-78. July 21, 1950.

A new species of *Streptomyces* designated *S. griseo-carneus* has been found to produce a new antibiotic which has been isolated in the pure form. Degradation studies have led to the identification of streptidine and N-methyl-L-glucosamine which are component parts of streptomycin. The remaining streptose-like portion of the molecule, however gave instead of maltol a compound which is presumably 2-hydroxymethyl-3-hydroxy-1,4-pyrone. This suggests that the new antibiotic probably has the same structure as streptomycin except that the methyl group of streptomycin is replaced by a hydroxymethyl group. Accordingly the name "hydroxystreptomycin" has been proposed for the new antibiotic.

THE USE OF FUNGAL AMYLASE IN THE INDUSTRIAL PRODUCTION OF ALCOHOL AND ALCOHOL PRODUCTS.

Richard W. Jackson, Russell H. Blom, and Henry M. Tsuchiya.
Symposium on Recent Advances in the Fermentation Industries at the University of St. Andrews. Russell Square, London, W.C. 1. Pages 93-107. July 1950.

The paper represents an hour lecture given at St. Andrews, Scotland, in 1949. The use of fungal amylase for the saccharification of starch in alcohol production was reviewed. Most attention was given to recent work, particularly the extensive studies made at the Northern Regional Research Laboratory. Topics dealt with were: Survey of molds for amylolytic enzymes, characteristics of fungal amylase preparations, methods of getting best yields of such enzymes, procedures for utilizing fungal amylase, and over-all technology and economics.

THE FLAVOR PROBLEM OF SOYBEAN OIL. VI. FLAVOR AND OXIDATIVE STABILITY OF FURFURAL FRACTIONATED OIL.

A. W. Schwab, Helen A. Moser, Patricia M. Cooney, and C. D. Evans.
Jour. Amer. Oil Chem. Soc. 27(8): 314-317. August 1950.

A study of flavor and oxidative characteristics of soybean oils fractionated with furfural has indicated, from taste panel evaluation, that upon storage the raffinate fractions do not develop the off flavors typical of soybean oil to the same extent as do the furfural extract or the original unfractionated oil. The fractionated oils were easily refined and deodorized to a light-colored and bland edible oil. Although the resistance of the raffinate fractions to oxidation was low, it was found that the addition of stabilizers such as phosphatides α-tocopherol and citric acid markedly improved the oxidative stability. Citric acid and phosphatides are believed to function in part as metal scavengers.

IMPROVED STRAW PULP FOR CORRUGATING PAPER.

H. M. Sutcliffe S. I. Aronovsky R. M. Wilkinson W. D. Burnham W. A. Phillips and E. R. Carpenter.
TAPPI 33(8) 353-357. August 1950.

This is a report on a large number of experimental cooks made on wheat straw in an attempt to produce improved pulps for corrugating paper. Because of its high hemicellulose content straw pulp is an excellent material for producing corrugating paper with high crush resistance. The chemicals were lime caustic soda, sodium sulfite, used singly in various combinations and in varying amounts The pulps prepared with caustic soda or sodium sulfite and with combinations of these two chemicals were distinctly stronger than lime cooked pulps The optimum results in this series of experiments were obtained with 6 percent NaOH, 10 percent Na_2SO_3 2 percent NaOH plus 4 percent Na_2SO_3 and 2 percent Na_2SO_3 plus 4 percent Na_2CO_3. The results indicated that suitable refining of straw pulp may be fully as important as the method used in preparing it.

ACETYLATION OF STARCH.

Rolland Lohmar and C. E. Rist.
Jour. Amer Chem. Soc. 72(9) 4298 4299. September 1950.

Starch may be readily converted to the triacetate by pyridine-acetic anhydride without the necessity of pregelatinization if the granules are activated by heating them in pyridine. If esterification is carried out in a non-solvent medium, acetates can be obtained in the form of granules. The primary hydroxyl group of starch does not acetylate selectively

COMPARATIVE COMPOSITION OF SOYBEAN AND CORN PHOSPHATIDES.

C. R. Scholfield T. A. McGuire and H. J. Dutton.
Jour Amer. Oil Chem. Soc. 27(9) 352-355. September 1950.

Corn phosphatides were separated into alcohol soluble and alcohol insoluble portions. The portions in turn were passed through the Craig countercurrent distribution apparatus, and were analyzed for choline nitrogen, total nitrogen phosphorous, sugar. and inositol. Significant differences in composition were found between soybean and corn phosphatides.

COMPOSITION OF THE COMPONENT PARTS OF THE SORGHUM KERNEL.

J. E. Hubbard H. H. Hall and F. R. Earle.
Cereal Chem. 27(5) 415-420. September 1950.

Grain from five varieties of sorghum was separated into endosperm, germ, and bran and the proportion of each determined. On the average, the kernel contains about 82 percent endosperm 10 percent germ and 8 percent bran. All fractions and the whole grain of each variety were analyzed for ash protein oil, and starch, and assayed for niacin pantothenic acid riboflavin biotin, and pyridoxin. The germ fraction was rich in all vitamins, being equaled only in the case of riboflavin in bran. As expected, the germ contained high concentrations of protein, oil, and ash, and the endosperm was high in starch.

RECENT PROGRESS IN SOYBEAN RESEARCH AT THE NORTHERN REGIONAL RESEARCH LABORATORY.
R. T. Milner.
Soybean Digest 10(11): 28-29, 82. September 1950.

A review of the Northern Regional Research Laboratory's research on soybeans during the fiscal year of 1949-50. The relation of the Laboratory's work to utilization of the soybean crop is discussed, with emphasis on the results of research on soybean phosphatides, soy flour, and flavor stability of soybean oil.

RIBOFLAVIN BY FERMENTATION WITH ASHBYA GOSSYPII.
V. F. Pfeifer, F. W. Tanner, Jr., Charles Vojnovich, and D. H. Traufler.
Indus. and Engin. Chem. 42(9): 1776 1781. September 1950.

It has been shown by this study that riboflavin, vitamin B_2, may be produced readily and in high yields when a nutritive medium of proper composition is subjected to pure culture fermentation by *Ashbya gossypii*, a yeast-like organism. The experiments were conducted on semi- and full pilot-plant scale to obtain engineering data. Production was by submerged culture. Satisfactory riboflavin yields of 500 to 600 micrograms per milliliter were readily obtained when a medium of proper composition was used. Many other factors that affected yield are discussed, as well as costs of production as of the time of the investigation.

ASHBYA GOSSYPII--ITS SIGNIFICANCE IN NATURE AND IN THE LABORATORY.
T. G. Pridham and K. B. Raper.
Mycologia XLII(5) 603-623. September-October 1950.

This is a review of the literature on the yeast-like fungus, *Ashbya gossypii* (Ashby and Howell) Guilliermond. It exists in nature as an important plant pathogen but in the laboratory constitutes a beneficient microorganism which may be employed either as the source of the important vitamin riboflavin (vitamin B_2), or as a useful tool in the microbiological assay for biotin.

BLOOD AND BLOOD PLASMA SUBSTITUTES.
Willard L. Cheesman.
U. S. Dept. Agr. Bul. AIC-289. 30 pp. (Processed.) October 1950.

This bibliography contains selected references to the literature and patents pertaining to blood and blood plasma substitutes and includes references relating to the treatment of blood and blood plasma as well.

COUNTERCURRENT DISTRIBUTION STUDIES ON FAT SOLUBLE PLANT PIGMENTS.
Catherine R. Lancaster, Earl B. Lancaster, and Herbert J. Dutton.
Jour. Amer. Oil Chem. Soc. 27(10): 386 390. October 1950.

The applicability of the Craig countercurrent distribution technique to the separation of lipids was tested by fractionating chlorophyll-a chlorophyll-b and carotene. Simplified equations for predicting the degree of separation of substances are derived. A nomographic solution of the equations is presented to facilitate their application.

DEXTRAN--A SELECTED BIBLIOGRAPHY.

Allene Jeanes.
U. S. Dept. Agr. Bul. AIC-288. 13 pp. (Processed.) October 1950.

This bibliography consists of references to the literature on dextran, the alpha-1 6- linked polymer of glucose, and covers: production of dextran on both laboratory and industrial scales, and related topics on microbiology and nutrition of *Leuconostoc mesenteroides* which synthesizes dextran; properties, structure, and characterization of dextran; preparation and use of "synthetic blood plasma" from dextran, and industrial and other applications.

GLUCONATE OXIDATION BY PSEUDOMONAS FLUORESCENS.

H. J. Koepsell
Jour. Biol. Chem. 186(2): 743-751. October 1950.

Gluconate oxidation by a strain of *Pseudomonas fluorescens* in a synthetic medium led to successive accumulation of 2-ketogluconate, α-ketoglutarate and pyruvate. Balance experiments indicated that those substances, with carbon dioxide and cells, were the only major products. Trace quantities of iron stimulated the oxidation markedly. The amounts of pyruvate and α-ketoglutarate accumulating were dependent on the amount of nitrogen supplied for cell proliferation. Yields of pyruvate and α-ketoglutarate are discussed in relation to contemporary hypotheses of carbohydrate oxidation mechanisms.

ISOMERIZATION AND TRANS-ESTERIFICATION.

J. C. Cowan.
Jour. Amer. Oil Chem. Soc. 27(11) 492-499. November 1950.

This is a lecture on esterification and isomerization reactions with emphasis on the behavior of fat acids. The problems associated with the use of these reactions for the preparation of improved drying oils are discussed.

A SIMPLIFIED PROCEDURE FOR THE CHARACTERIZATION OF STARCH FRACTIONS BY VISCOSITY AND IODINE SORPTION.

Ivan A. Wolff, Laetta J. Gundrum and C. E. Rist.
Jour. Amer. Chem. Soc. 72(11): 5188-5191. November 1950.

A simplified method is presented for determining the intrinsic viscosity and the iodine affinity of a starch fraction. Equations are given for estimating accurately the intrinsic viscosities of amyloses and amylopectins in 1 _N_ potassium hydroxide solution from relative viscosities taken at 0.2 percent concentration. Iodine affinities of these same alkaline solutions are determined potentiometrically, to measure the proportion of linear material in the starch fractions. Experimental data are presented illustrating the validity of the method.

STUDIES ON A RAPID TEST FOR THE VIABILITY OF CORN FOR INDUSTRIAL USE.

Peggy D. Baird, M. M. MacMasters and C. E. Rist.
Cereal Chem. 27(6): 508-513. November 1950.

The 2,3,5-triphenyltetrazolium chloride test for viability is suggested as a means of detecting corn kernels that have been killed by high temperature during drying or by freezing, and for determining the percentage of dead kernels in corn before purchase. The test with the reagent is simple and requires only 4 hours for completion.

SURFACE AREA OF STARCH AND ITS ROLE IN WATER SORPTION.

N. N. Hellman and E. H. Melvin.
Jour. Amer. Chem. Soc. 72(11): 5186-5188. November 1950.

In a study of dasheen, corn, tapioca, and potato starches, the surface area measured as available to nitrogen at 195° was found to be 2.62, 0.70, 0.28, and 0.11 m^2/g, respectively. "Surface areas" calculated by the BET equation required to account for the observed water sorption of these four starches would be, respectively, 330, 334, 348, and 422 m^2/g. It is concluded that the nitrogen-available surface area of starch does not give a quantitative explanation of the water-sorptive capacity of starches of different botanical origin. The apparent external surface area of these starches was also determined photomicrographically and found to be in close agreement with the nitrogen-available surface area, showing that pores in starch granules must be few and possess low surface area or they do not communicate with the external surface through pores permeable to nitrogen gas at 195°. Water sorption isotherms of the starches at 25° as determined by a static equilibration method are given. For potato starch, the low water sorption at low relative water vapor pressures and the high water sorption at high pressures are attributed to a lower energy of sorption and a higher number of sorbing sites for potato starch relative to the other three starches studied.

WET MILLING OF GRAIN SORGHUM

R. L. Zipf, R. A. Anderson, and R. L. Slotter.
Cereal Chem. 27(6): 463-476. November 1950.

As a result of studies on the recovery of starch, gluten, and oil from grain sorghums, it has been shown that this grain can be processed satisfactorily by methods employed industrially for the wet milling of corn.

IMPROVED TECHNIQUES FOR STUDY OF THE HYDROLYSIS OF AMYLOSE BY MALT ALPHA AMYLASE.

R. J. Dimler, R. C. Bachmann, and H. A. Davis.
Cereal Chem. 27(6): 488-495. November 1950.

Improved methods have been developed for the hydrolysis of amylose, the linear fraction of starch, with malt alpha amylase and for the analytical study of the resulting products. Amylose solutions of 3 to 4 percent concentration were hydrolyzed by a method developed to avoid retrogradation. Carrying out the reactions at 70° C. and in the presence of 0.1 percent calcium chloride not only prevented retrogradation but destroyed any beta amylase which might have been present. Qualitative analysis by paper partition chromatography demonstrated clearly that the hydrolytic products at the achromic point consisted of at least 10 reducing compounds. The presence of glucose and maltose was confirmed by comparison with the known sugars. Presumably the other carbohydrates present constituted the homologous series of oligosaccharides up to a degree of polymerization of 10 glucose units.

THE PARTIAL HYDROGENATION OF DIFURFURALACETONE AND RELATED COMPOUNDS.

Kliem Alexander, L. S. Hafner, George H. Smith, Jr., and L. E. Schniepp.
Jour. Amer. Chem. Soc. 72(12): 5506-5507. December 1950.

The copper chromite catalyzed hydrogenation of furfural-ketone condensation products is shown to be a satisfactory method for making furyl- and difuryl-alkanols. The main side-reaction products apparently are substituted 1,9-dioxa-5-spirononanes. They are separated by extraction from the alkaline solutions of the hydrogen phthalates of the alkanols. The preparation and properties of the following compounds and their derivatives are described 1-furyl-butanol-3 1 5-difuryl-pentanol-3, 1 5-difuryl-2-methyl-pentanol-3, 1,5-difuryl pentanol-1, 2,6-difurfurylcyclohexanol, 2,5-difurfuryl-cyclopentanol 1,9-difurylnonanol 5 and 1-furyl-3-phenylpropanol 1.

PHOSPHORYLATION OF STARCH.

Rolland Lohmar, John W. Sloan, and C. E. Rist.
Jour. Amer. Chem. Soc. 72(12): 5717-5720. December 1950.

Insoluble starch phosphates were obtained by reacting starch with phosphorus oxychloride after the starch had first been made reactive by heating the granules in pyridine. Phosphates so prepared retained their granular form and were resistant to swelling in water. They had cation exchange properties and could be converted to insoluble non-swelling salts. The larger granule starches were less reactive than those having smaller granules.

STABILIZATION OF ZEIN FILAMENTS BY BAKING.

C. Bradford Croston and Cyril D. Evans.
Textile Res. Jour. 20(12) 857 858. December 1950.

This study shows that stabilization of filaments spun from formaldehyde-treated alkaline dispersions of zein may be obtained by baking at 160° C. A decreased shrinkage in water at room temperature was particularly evident in the larger filaments or bristles and was adequate for many purposes. Strengths were not reduced appreciably by the treatment.

REPUBLICATIONS

LIME AS A HARDENING AGENT IN SOYBEAN OIL PAINTS.

A. J. Lewis
Paint, Oil, and Chem. Review 113(15) 25-26 28. July 20. 1950.

[Previously published in The Soybean Digest 10(8): 17 18. June 1950.]

CONTRACT RESEARCH PUBLICATIONS

(NRRL research under contract with outside agencies)

FLAVOR REVERSION IN SOYBEAN OIL V ISOLATION AND IDENTIFICATION OF REVERSION COMPOUNDS IN HYDROGENATED SOYBEAN OIL.

A. I. Schepartz and B. F. Daubert, Department of Chemistry University of Pittsburgh, Pittsburgh Pennsylvania. (A report of work done under contract with the U. S. Department of Agriculture and authorized by the Research and Marketing Act. The contract is being supervised by the Northern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry.)
Jour. Amer. Oil Chem. Soc. 27(10) 367 373. October 1950.

Maleic dialdehyde di n propyl ketone and 2-heptanal were isolated and identified in condensates from reverted hydrogenated soybean oil.

FLAVOR REVERSION IN SOYBEAN OIL. VI. ISOLATION AND IDENTIFICATION OF REVERSION COMPOUNDS IN UNHARDENED SOYBEAN OIL.

R. J. Stapf and B. F. Daubert, Department of Chemistry, University of Pittsburgh, Pittsburgh, Pennsylvania. (A report of work done under contract with the U. S. Department of Agriculture and authorized by the Research and Marketing Act. The contract is being supervised by the Northern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry.)
Jour. Amer. Oil Chem. Soc. 27(10): 374-377. October 1950.

Two compounds possibly contributing to the reversion flavor were isolated and identified in condensates from reverted unhardened soybean oil. They are $\Delta^{2:4}$ decadienal and acetaldehyde.

PATENTS

[These patents are assigned to the Secretary of Agriculture. Copies of patents may be purchased from the U. S. Patent Office, Washington, D. C.]

PROCESS FOR MANUFACTURE OF PENALDIC ACIDS AND THEIR DERIVATIVES.

Samuel A. Morell and Richard W. VonKorff.
U. S. Patent 2,516,900. August 1, 1950. Dedicated to the People of the United States of America.

A process is claimed of preparing ethyl alpha-amino beta, beta-diethoxy propionate hydrochloride comprising subjecting the sodium enolate of ethyl alpha-formylamino beta-hydroxy acrylate to the action of a solution of hydrogen chloride in ethanol.

MILDEW RESISTANT PAINT

Arthur J. Lewis.
U. S. Patent 2,517,580. August 8, 1950.

A red oxide paint, suitable for use on barns and other farm buildings, is composed of soybean oil as the principal oil vehicle, a red iron oxide pigment, a drier, and a minor amount of calcium oxide. The painted coatings have good durability and color retention and are highly resistant to discoloration by mildew.

N-(2-CYANOETHYL)-2-PYRROLIDONE-5-CARBOXYLIC ACID AND METHODS FOR ITS PREPARATION.

Leonard L. McKinney, Eugene H. Uhing and John C. Cowan.
U. S. Patent 2,517,585. August 8, 1950.

The novel compound is made by acid hydrolysis of the reaction product of a salt of glutamic acid with acrylonitrile.

PHENOLIC MOLDING RESINS.

Thomas F. Clark.
U. S. Patent 2,520,913. September 5, 1950.

Phenol and formaldehyde are heated in the presence of an acid catalyst to produce a molten thermosetting molding material which is subsequently washed in the molten state with water and a neutralizing agent to remove water-soluble low-molecular weight polymers and to granulate the mass. The granules are washed with water and dried and subsequently mixed with saccharification lignin and minor amounts of hexamethylene tetramine and calcium hydroxide. The mixture is compounded by milling and heating. The product has improved water absorption characteristics.

FIBERS FROM ZEIN.

Cyril D. Evans. Chester W. Ofelt and Allan K. Smith.
U. S. Patent 2 521,704. September 12, 1950.

Aqueous alkaline dispersions of zein are formed in a medium having a pH of about 11 to 12.8. The dispersion is effected by an alkali metal hydroxide and the ingredients are proportioned so as to give a viscosity of 10 to 1 000 poises. The dispersions are spun into a liquid coagulating medium containing a strong mineral acid and an organic acid. The spun fibers are then cured and dried.

PROCESS FOR THE UNINTERRUPTED RECIRCULATION OF UNREFINED ALCOHOLIC FATTY OIL SOLVENT.

Arthur C. Beckel John C. Cowan and Paul A. Belter.
U. S. Patent 2 524 037. October 3 1950.

Fatty oils are extracted with a hot lower alcohol solvent from vegetable materials such as soybeans cottonseed other seeds and nut meats. The hot extract is cooled to separate the oil, and the alcohol solution is recycled without further refinement to extract fresh material.

The invention relates specifically to the extraction of soybean oil from flaked soybeans that have been dried to below 3 percent moisture. The process can be carried out continuously draining solvent from the extracted flakes recovering oil from the extract, and evaporating alcohol from the drained wet flakes. The system needs no alcohol bleed off other than that entrained upon the drained flakes.

CURING PROLAMINE FIBERS WITH ALDEHYDE IN LIQUID ORGANIC MEDIUM.

Clarence Bradford Croston Cyril D. Evans Leonard L. McKinney and John C. Cowan.
U. S. Patent 2 524 042 October 3 1950.

Zein fibers or other shaped bodies are given a treatment to produce an acid stable water-resistant product by an acid-catalyzed aldehyde cure carried out at elevated temperatures in a substantially anhydrous medium.

The method relates particularly to zein fibers, which may or may not be previously cured by known methods. The fibers are treated by heating in a medium, such as dioxane toluene or other hydrocarbon solvent containing a relatively strong acid and a minor proportion of an aldehyde or aldehyde-yielding agency. The treatment imparts water resistance and high wet strength to the fibers.

WET MILLING OF GRAIN SORGHUM

Richard L. Slotter and Roy A. Anderson.
U. S. Patent 2 527 585. October 31 1950.

The outer hull is removed from grain sorghum by a pearling operation prior to wet milling the grain. Removal of the colored hulls leads to an improved quality of starch and oil

VACUUM DISTILLATION.

Francis J. Castle and Robert E. Beal.
U. S. Patent 2,530,376. November 21, 1950.

A vacuum still is described, particularly suitable for removing volatile constituents from glyceride oils. The still consists of a heated evaporation surface supplied with a covering of inert mesh fabric to distribute the distilland over the evaporation surface and to retain residual tars and gums formed during evaporation. The fabric may be removed and cleaned when necessary.

HYDROGENATED FURFURALACETOFURAN.

Kliem Alexander.
U. S. Patent 2,532,279. December 5, 1950.

Furfuralacetofuran is hydrogenated to produce derivatives varying in degree of hydrogenation from the simple saturation of the double bond in the aliphatic chain to the completely hydrogenated compound, 1,3-ditetrahydrofurylpropanol-1.